RAILROAD GAZETTE

FRIDAY, APRIL 3, 1896.

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## Contributions.

### Locomotives During the War.

*Philadelphia, Wilmington & Baltimore R. R. Co.,*
MEDIA, Pa., March 26, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I noticed in your issue of the 20th inst., under the heading "Military Railroads During the War of the Rebellion," the high prices paid for locomotive engines at that time. The highest price mentioned in the article, viz., $17,902, falls considerably short of the price paid for a locomotive by the West Chester & Philadelphia Railroad (now part of this Division), as the following extract from the annual report of that company for 1865 shows:

"During the year the company purchased one new locomotive at a cost of $24,150, or nearly three times the price of same class of engines before the war."

This was a Baldwin, eight-wheel, passenger engine (No. 8), with cylinders 14 in. × 24 in. Its weight I am unable to state. H. C. SMITH, *Engineer.*

### The Engineer and the Rights of Man.

NEWTON, Iowa, March 23, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Is it not about time to determine whether there is an ethical side to engineering? There has been a Commission appointed by the present administration to determine whether Chicago's Drainage Canal will lower the surface of Lake Michigan, but it has never reported. The presumption has been expressed that the surface of water would be lowered three inches. This three inches, or even a single inch, Chicago has no right to.

Indiana wants a canal from Lake Michigan to the Wabash; Pittsburgh wants a canal from Lake Erie to the tributaries of the Ohio; the North American Canal Company wants one from the St. Lawrence River to the Hudson; Canada wants one from Georgian Bay to the St. Lawrence, via Ottawa, and the Ottawa River; and perhaps one will be asked for from Georgian Bay to Lake Ontario. All have as good right to divert water from its natural course as Chicago.

I do not know that there is a summit between Georgian Bay and the head of the Ottawa River, so that locks up, going east, would be required, and that the canal by Ottawa would be fed by something else than the waters of the great lakes; nor that the same condition would rule via Pittsburgh. All of these questions should be settled before *any* of these canals is built or projected. It may be well questioned whether the Dominion has a right to charter any canal company that proposes to divert water from the St. Lawrence River to the Hudson, and thus *give away* the rights of people on the St. Lawrence below Lake St. Francis.

Again, John C. Coombs, and the people of Sioux City, Duluth, St. Paul and Minneapolis, are after government aid for a railroad from Sioux City to North Platte. While there is no question about an outrage having been perpetrated in building the "Sioux City Branch of the Union Pacific" down the Missouri River, government aid should not be granted to any branch of the Pacific roads. Perhaps the same persons would be profited, and are at the bottom of this project, as have been benefited by the original outrage.

D. H. AINSWORTH.

### Light Railroads in England.

LONDON, March, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Just at the present moment light railways are being looked upon as the cure for the so-called depressed condition of agriculture in Great Britain. Those who call so loudly for these light lines have probably very little idea of what a light railway is, but it is very certain that, given the freedom from exacting government regulations, the construction of a railway in this country need cost no more per mile than in America, where pioneer lines are virtually constructed as light railways so far as it is likely the proposed new lines here are understood by engineers.

Any attempt to lay rails along the highways is certain to be attended by failure, for an iron rail cannot be laid along an ordinary road without the immediate creation of ruts in the road surface; hence the paving of tramway tracks to prevent ruts. But paving is costly, and the anticipated traffic to be secured by the light railway will not afford so great an expense. It follows, therefore, that such lines must either be constructed upon their own land, across country, or, where this exists, along what the Lincolnshire fen people call the "cess"—a strip of grass land bordering the roads on one or both sides, of considerable breadth and eminently suitable for railway purposes. The demand that such lines should be fenced off from the road proper is unreasonable, and calculated to lay a charge upon the line that in the very nature of things it cannot stand.

There is such a line already existent in England. It is of standard gage and extends from the station yard at Wisbech in the Fenland to the outlying small towns or villages of Upwell and Outwell. This line had a physical connection with the Great Eastern Railway, and the G. E. freight trucks were run along it, but not the loco motives. I made an inspection of the Wisbech line some years ago when engaged upon a somewhat similar project. It was quite unfenced and was principally laid along the cess, excepting where a diversion through the fields proved more convenient. Mixed trains were run and cars were dropped and picked up along the route, and passengers boarded the train at any spot, and the line seemed to have in it the elements of success.

The trouble with our agriculturists is, however, that they do not grasp the necessities of the case. Foreign produce it is true is carried cheaper than home produce. The railways tell us they would carry English produce as cheaply if it were in equal bulk. Though this is perhaps not true, it is certain that our own farmers would do well to pool their interests and send goods in greater bulk. Instead of doing so they have so far as East Anglia is concerned made arrangements with the Great Eastern Railway to convey and deliver to private consumers small parcels of produce in unreturnable cheap boxes which the company will themselves make and supply. Thus a farmer delivers goods direct to the consumer, and I fear very much the system is quite wrong. I have made some little enquiry and taken for example the case of one man who advertises a $2½ case of farm produce and find that when priced out at ordinary suburban store prices the articles can be purchased by any housekeeper for $2 to $2¼. The farmer is by no means in such bad plight as he would have us believe. He will tell you how he sent a ton of apples to market and after paying carriage, etc., has had four pence to receive from his London agent for the whole ton, but nevertheless he will ask you six pence or a shilling for the few you carry off in your hand bag. I have proved it over and over again and find that we can have goods brought to the house door for less than the farmers' cash price on spot. The revival of the farmer will never be accomplished by this small package system, for his prices are too high. Neither will the light railway do him much good unless he is prepared to dispatch produce in a more wholesale manner, and will insist upon the equality of rates with the foreign producer which he could have enforced by the Railway Commissioners. Instead of doing so he asks for protection, which, if granted, would simply raise his rent for the sole benefit of the landlord, as may be guessed from the assiduity with which certain noble lords push this view. M. AM. SOC. C. E.

### Railroad and Traffic Matters in Colombia.

BARRANQUILLA,
Republic of Colombia, March 1, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have given considerable attention to the traffic that is being passed from here to the interior of Colombia by way of Honda, or the headwaters of river navigation via Rio Magdalena, 600 miles to the south, and find that since the new pier of the Barranquilla Railroad & Pier Company has been completed, and the mouth of the Magdalena River (Boca Ceniza) has once more been made navigable, traffic has found a new impetus, and this city, the veritable New Orleans of Colombia, has been making progressive strides far in advance of any other city of tropical America. Although there is no census of this city to guide my calculations, I have sufficiently investigated the matter to lead me to believe that the population, which in 1860 was considerably less than 10 000 inhabitants, will now very nearly approximate 50,000. From the period of 1885 to 1892 the city and the railroad which now connects it with the steel pier, 4,000 ft. in length, at Puerto Colombia received a series of systematic setbacks which it would be useless to enumerate. The indisputable superiority of the wharfage and river navigation facilities, and the facts that the railroad rates are very low over a line 18 miles in length, and that the city is well drained, is supplied with a suitable water-works, ice machine, electric plant and street railroad, have done much to attract merchants from Europe and the states and transformed the port into a cosmopolitan city. Out of the total import and export trade of the country, amounting to about $35,000,000, $22,560,321 has passed through this custom house during the year of 1895; the rest of the trade was divided between Maracaibo, Buena Ventura, Cartagena and other smaller ports and the Isthmus of Panama.

The barkentine Ora and the steamer Solidad have been the first boats to venture over the Magdalena bar for some years, and the Ora is now in port discharging. A new railroad is projected from the lower Magdalena River to Bogota, the capital starting at the Rio Negro and uniting with the Zipaquira Railroad on the plains of Bogota. This road is destined to do much to open up a country rich in minerals as well as agricultural products. Another effort is also being made to carry to completion the Girardot Railroad by American capitalists, this being the fourth effort in that direction since Mr. Cisneros begun the work some years ago.

The washout which was reported by cable and which suspended traffic on the Cartagena-Magdalena Railroad for some time has been fully repaired and the road is doing its usual business, via Calamar, 62 miles from the port of entry. It is said that this road, which belongs to an American company is beginning to pay running expenses and, for the effect which the success of this investment of $2,000,000 of American money will have upon future investments, it is to be hoped that it will soon begin to pay dividends. This road is the only competitor to that running from this city to Puerto Colombia or Sabanilla.

To show the progress made during the last two months by the Cartagena and Barranquilla roads I give the following taken from the *Shipping List* of this city:

STATEMENT OF THE NUMBER OF PACKAGES ARRIVED IN VESSELS TOUCHING BOTH SABANILLA AND CARTAGENA.

| | Barranquilla. | Cartagena. |
|---|---|---|
| November | 20,598 | 7,575 |
| December | 31,963 | 1,135 |
| Total | 52,561 | 18,710 |

The above represents 3,628 tons for the Barranquilla as against 935 tons on the Cartagena road. Of course, we must remember that this treats of freight from ships touching both ports and not the total business of the roads, there being many steamship companies whose vessels touch either port exclusive of the other. The charge here, in gold, for freight to and from Barranquilla to Puerto Colombia is about $2 per ton. I would estimate the actual cost of carrying the freight at considerably less than $1 per ton.

It is gratifying to note the growing demand in this market for American goods to the exclusion of English and German products. C.

### Supreme Court Decision Compelling Witnesses to Give Self-Incriminating Evidence.

The decision of the United States Supreme Court affirming the punishment of Theodore F. Brown for contempt of court was reported in the *Railroad Gazette* of March 27, page 216. The full text of the decision has since been received. The impression gained from reading the decision of the court, by Justice Brown, and the two dissenting opinions, is that Mr. Brown's view secured a majority vote largely by what may be termed the preponderating weight of authority. He cites a great many decisions by state courts and the courts of England in support of the view that the immunity granted to witnesses by the constitution of the United States should be limited to what the court may deem beneficent and practical purposes. In various cases cited a witness who once waived his privilege was compelled to make a full disclosure and not stop half way. Various modern statutes permit such a witness to be cross-examined. Where the crime concerning which the witness is questioned is barred by the statute of limitations he has been compelled in numerous cases to answer. Six cases are cited to show that the witness must answer even if the evidence may have a tendency to disgrace him, though if the answer can have no effect upon the case, except to impair the credibility of the witness, he may retain his privilege of silence. The concluding paragraph on this point says:

It is entirely true that the statute does not purport, nor is it possible for any statute to shield the witness from the personal disgrace or opprobrium attaching to the exposure of his crime; but, as we have already observed, the authorities are numerous and very nearly uniform to the effect that, if the proposed testimony is material to the issue on trial, the fact that the testimony may tend to degrade the witness in public estimation does not exempt him from the duty of disclosure. A person who commits a criminal act is bound to contemplate the consequences of exposure to his good name and reputation, and ought not to call upon the courts to protect that which he has himself esteemed to be of such little value. The safety and welfare of an entire community should not be put into the scale against the reputation of a self-confessed criminal, who ought not, either in justice or in good morals, to refuse to disclose that which may be of great public utility, in order that his neighbors may think well of him. The design of the constitutional privilege is not to aid the witness in vindicating his character, but to protect him against being compelled to furnish evidence to convict him of a criminal charge. If he secure legal immunity from prosecution, the possible impairment of his good name is a penalty which it is reasonable he should be compelled to pay for the common good.

Judge Brown says that although the fifth amendment of the constitution is based on English law of two centuries, there was no statute in that country, the principle, as a rule of evidence, having become fixed by a general and silent acquiescence of the courts in a popular

demand. It is held that the law of Feb. 11, 1893, protects witnesses in state courts as well as federal. It is true that a witness testifying under the protection of this law may still be put to the annoyance of defending himself for prosecution, but this is a danger which any innocent citizen is subject to. Judge Brown holds that the accused auditor could not have been a substantial offender against the law, as he only had to audit accounts and pass vouchers. His duty was simply to see that others had done what they purported to have done and that the vouchers were genuine.

The first dissenting opinion, that by Justice Shiras, quotes at length from Aaron Burr's trial before the Circuit Court in Virginia in 1807, and from Boyd vs. United States (116 U. S., 616); also from the decision in the Counselman case (142 U.S.,547), delivered by Justice Blatchford before the law of 1893 was passed. The presence of this immunity clause in our constitution creates a presumption against any legislative act professing to dispense with the constitutional privilege. Continuing, Judge Shiras says:

What, then, is meant by the clause in this act that "*no person shall be prosecuted* . . . for or on account of any transaction, matter or thing, concerning which he may testify, or produce evidence, documentary or otherwise?' How possibly can effect be given to this provision, if taken literally? If a given person is charged with a willful violation of the Interstate Commerce act, how can the prosecuting officers or the grand juries know whether he has been examined as a witness concerning the same matter before the commission or some court? Nor can the accused himself necessarily know what particular charge has been brought against him, until an indictment has been found. But when an indictment has been found, and the accused has been called upon to plead to it, be assuredly has been *prosecuted*. So that all that can be said, is that the witness is *not* protected, by the provision in question, from being *prosecuted*, but that he has been furnished with a good plea to the indictment, which will secure his acquittal. But is that true? Not unless the plea is sustained by competent evidence. His condition, then, is that he has been prosecuted, been compelled, presumably, to furnish bail, and put to the trouble and expense of employing counsel and furnishing the evidence to make good his plea. It is no reply to this to say that his condition, in those respects, is no worse than that of any other innocent man, who may be wrongfully charged. The latter has not been compelled, on penalty of fine and imprisonment, to disclose under oath facts which have furnished a clue to the offense with which he is charged. Nor is it a matter of perfect assurance that a person who has compulsorily testified, before the commission, grand jury or court, will be able, if subsequently indicted for some matter or thing concerning which he testified, to procure the evidence that will be necessary to maintain his plea. No provision is made in the law itself for the preservation of the evidence. Witnesses may die or become insane, and papers and records may be destroyed by accident or design.

The danger of being indicted for perjury, which the act expressly refrains from offering any protection against, is also held to be a grave point. Judge Shiras thinks the provisions of the law of 1893 would not extend to the state courts, and he quotes several decisions at length in support of this point. Next he takes up the argument of the supposed importance of enforcing the Interstate Commerce Act. He says:

This, at the best, is a dangerous argument, and should not be listened to by a court, to the detriment of the constitutional rights of the citizen. If, indeed, experience has shown, or shall show, that one or more of the provisions of the Constitution has become unsuited to affairs as they now exist, and unduly fetters the courts in the enforcement of useful laws, the remedy must be found in the right of the nation to amend the fundamental law, and not in appeals to the courts to substitute for a constitutional guaranty the doubtful and uncertain provisions of an experimental statute. It is certainly speaking within bounds to say that the effect of the provision in question, as a protection to the witness, is purely conjectural. No court can foresee all the results and consequences that may follow from enforcing this law in any given case. It is quite *certain* that the witness is *compelled* to testify against himself. Can any court be *certain* that a sure and sufficient substitute for the constitutional immunity has been supplied by this act; and if there be room for reasonable doubt is not the conclusion an obvious and necessary one?

It is worthy of observation that opposite views of the validity of this provision has been expressed in the only two cases in which the question have arisen in the Circuit Court—one, in the case of the *United States vs. James*, (60 Fed. Rep. 257), [Judge Grosscup's decision] where the act was held void; the other, the present case. In most of the cases cited wherein State courts have passed upon analogous questions, and have upheld the sufficiency of a statute dispensing with the constitutional immunity, there have been dissenting judges. A final observation, which ought not to be necessary, but which seems to be called for by the tenor of some of the arguments that have been pressed on the court, is that the constitutional privilege was intended as a shield for the innocent as well as for the guilty. A moment's thought will show that a perfectly innocent person may expose himself to accusation, and even condemnation, by being compelled to disclose facts and circumstances known only to himself, but which, when once disclosed, he may be entirely unable to explain as consistent with innocence.

The dissenting opinion of Justice Field lays special stress on the importance of the constitutional safeguard as springing from the sentiment of personal self-respect, liberty, intelligence and dignity, which has inhabited the breasts of English-speaking people for centuries, and to save which they have always been ready to sacrifice many governmental facilities and conveniences. The Supreme Court has heretofore declared that no attempted substitute for a constitutional safeguard is sufficient unless it is a complete substitute. This law is not such.

"A witness, called upon to testify to something which will incriminate him, claims the benefit of the safe guard; he is told that the statute fully protects him against prosecution for his crime; 'but,' he says, 'it leaves me covered with infamy and unable to associate with my fellows;' he is then told that *under the rule of the common law* he would not have been protected against mere infamy, and that the constitutional provision does not assume to protect against infamy *alone*, and that it should not be supposed that its object was to protect against infamy even when associated with crime. But he answers: 'I am not claiming any common law privilege, but this particular constitutional safeguard. What its purpose was does not matter. It saves me from infamy, and you furnish me with no *equivalent*, unless by such equivalent I am equally saved from infamy.' And it is very justly urged that 'a statute is not a full equivalent under which a witness may be compelled to cover himself with the infamy of a crime, even though he may be armed with a protection against its merely penal consequences.' . . . The position that if witnesses are allowed to assert an exemption from answering questions when in their opinion such answers may tend to incriminate them, the proof of offense like those prescribed by the Interstate Commerce Act will be difficult and probably impossible—ought not to have a feather's weight against the abuses which would follow necessarily the enforcement of criminating testimony."

The law of Feb. 11, 1893, also violates the fourth amendment, which asserts the right of the people to be secure in their persons, houses, papers and effects against unreasonable searches and seizures. The constitutional safeguards for security and liberty cannot be thus dealt with. They must stand as the Constitution has devised them. They cannot be set aside and replaced by something else on the ground that the substitute will probably answer the same purpose. The citizen is entitled to the very thing which the language of the Constitution assures to him. The essential and inherent cruelty of compelling a man to expose his own guilt is obvious to every one, and needs no illustration. It is plain to every person who gives the subject a moment's thought. A sense of personal degradation in being compelled to incriminate one's self must create a feeling of abhorence in the community at its attempted enforcement.

Justice Field also declares that the law under consideration grants a pardon, which is without the power of Congress. The Supreme Court has held that the President's power of granting pardon may be exercised at any time after the commission of the offense, either before legal proceedings are taken or afterward.

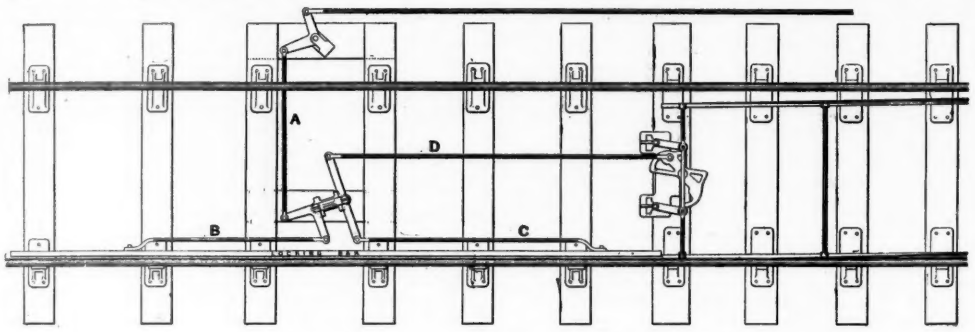



Fig. 1.—Black's "Economical" Detector and Locking Bar.

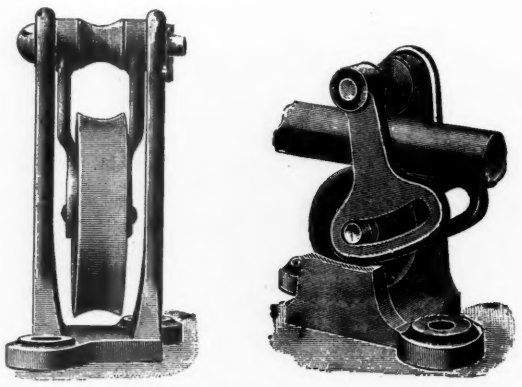


Fig. 2.—Charrington's Suspended Roller.

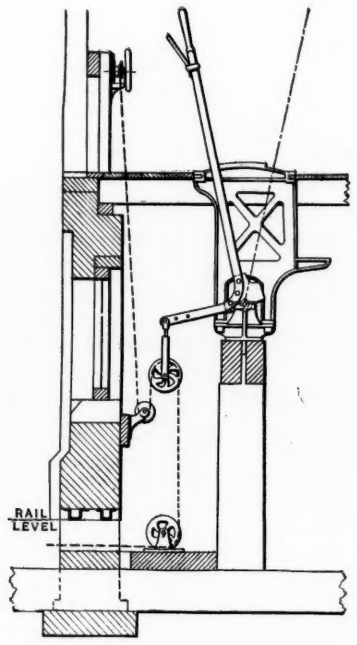



Fig. 3.—Wire Compensator.

## Interlocking at Toronto.

The Grand Trunk Railway of Canada has recently equipped its yards at Toronto with interlocking signals, the material for which came from England, and as this is the largest and most important installation of English signal apparatus of recent design in this country, if not the only one, a brief description of its principal characteristics will be of interest.

A branch road joins the main line near the Union passenger station, and there is also a connection with the Canadian Pacific, so that there are in all four cabins, within a space of about one mile, aggregating 189 levers, The largest machine is that at cabin A, at the east end of the Union station, which has 66 levers. Cabin B, at the west end, has a machine with 60 levers, this cabin controlling the entrance to the station and also the tracks leading to the engine house yard. Cabin C, at Brock street, has 14 levers. This cabin also controls tracks leading to the Canadian Pacific freight house. Cabin D, at Bathurst street, where there is a branch and also a connection with the Canadian Pacific, has 49 levers. All of the machines, as well as the other apparatus, were furnished by Saxby & Farmer, of London, and they are of the duplex plunger spring catch pattern.

The facing point locks are Black's patent "Economical," in which the locking bar is an essential part of the connection between the lever and the switch rails. This lock is shown in Fig. 1. The rod *D* is moved through the instrumentality of *C*, and *C*, of course, can be moved only by means of the locking bar and rods *B* and *A*. This arrangement prevents the possibility of moving the switch without disturbing the bar, as may be done, in case of breakage, where there is a direct connection between rods *A* and *D*.

All rods connecting levers with switches are carried on Charrington's suspended roller, shown in Fig. 2.

All signals are worked by single wires, and Fig. 3 shows the arrangement by which wires extending to signals a long distance from the cabin are adjusted to variations in temperature. By means of the hand wheel, fixed in the cabin, the signalman can make the adjustment as often as necessary without leaving h post.

All reverse or "back-up" movements are governed by ground signals—disks and lamps fixed on a short standard and revolving on a vertical axis, similar to those long in use at the Grand Central Station in New York City. In the Grand Trunk disk signals, shown in Fig. 4, the lamp is supported by a fixed rod or spindle fastened to the base plate and running up inside of the tube or sleeve supporting the outer revolving lantern which carries the disk and the colored lenses. Thus the lamp is always stationary and cannot be effected by the jarring of the outer lantern when it is revolved.

All the signals are lighted by electricity. Those used as starting signals at the passenger platforms are fitted with auxiliary disks to be used in switching movements, and signals for tracks which are used exclusively for freight have rings fixed to the arms, after the English fashion. All arms appear at the left of the post, as viewed by an approaching engineman. (Grand Trunk trains run on the left hand track.) To indicate the all-clear position, arms are dropped to an angle of 60 deg. and the lights are so arranged as to show red for danger and green for safety.

All of the cabins are fitted with electrical dial indicators to give the signalman instantaneous information of the movement of trains, at various points. At cabins A and B there are signal bridges consisting each of a single pair of girders, supporting certain signals over the tracks to which they pertain.

Fig. 5 is a diagram showing the arrangement of tracks at cabin A.

## Colors for Night Signals.

At the last meeting of the Railway Signaling Club, Chicago, a committee, Messrs. W. B. Turner, J W. Peck, H. C. Wilson, G. M. Basford and E. D. Wileman, made a report on the above subject. The committee begins with a description of the present practice in this country, on most roads red for danger, green for caution, white for clear; on three roads in New England, lamps, three at each signal, with suitable blinders, to show a semi-position indication at night; and Carter's arrangement, on the Chicago & Northwestern, of red for danger, green for clear and a distant signal showing red and green side by side to indicate caution. One small road uses green for clear and white for caution

The report contains a letter from Mr. H. R. Wilson, of the Lancashire & Yorkshire, suggesting that the "calling-on arm," used in England, would be suitable for use in this country where permissive blocking is practiced. Mr. Wilson quotes the regulations for the use of calling-on signals. The arm, a small one, is attached to the lower part of the home signal post, and when pulled down authorizes the train to move forward as far as the line is seen to be clear. [Mr. Wilson does not state, however, what we understand to be the fact, that such signals are used only for short distance movements in yards.] The rule requires the signalman to stop trains at the home signal before he permits them to move by lowering the calling-on arm. At night the calling-on arm shows green for go ahead and no light when it stands horizontal. It is interlocked with the home signal, so that only one of the two can be pulled off at the same time.

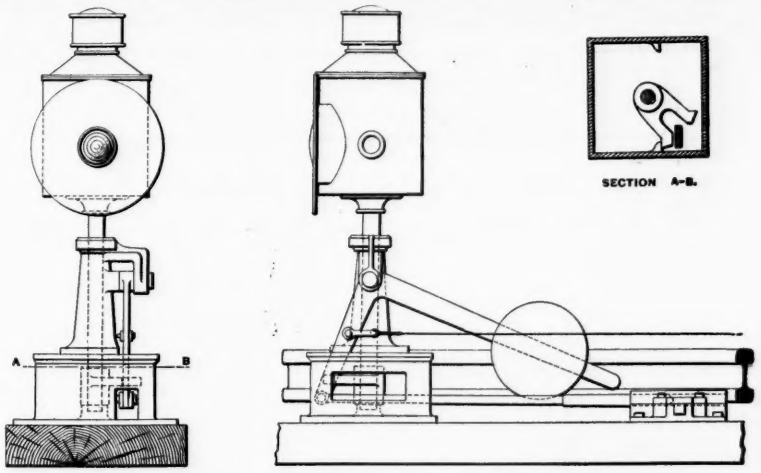



Fig. 4.—Ground Signal—Toronto Interlocking.

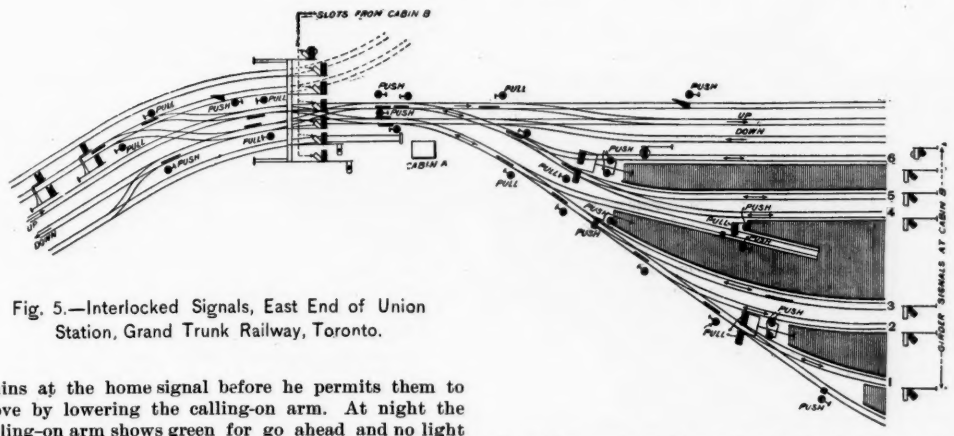



Fig. 5.—Interlocked Signals, East End of Union Station, Grand Trunk Railway, Toronto.

The committee refers to illuminated blades, but does not regard them as sufficiently perfe ted to recommed them. Neither does it approve the use of more than one light at a signal. It is mentioned that several patents have recently been taken out for illuminating a semaphore blade by a line of incandescent electric lamps.

In considering the general subject the committee rejects Carter's system because its general adoption would be too expensive, though the committee holds that the use of green and red together is no more inconsistent than our present practice of showing a green and a red light, one above the other, on the same post, at route signals. White is unsuitable for caution because a broken red glass might then give a cautionary indication where it should be danger. The calling on signal would conflict with our present plan of route signals.

In view of these objections the committee deems it unwise to recommend any change from the present widely used system. The colored glasses should be thickened or have wire netting imbedded in them. Wire nettings have been used with good effect outside of common glass lenses. It is not considered an objection that some other white light may be mistaken for a clear signal, because "experience has shown that trouble is not to be anticipated on this account."

In the discussion on this report the first thing was a letter from Mr. A. H. Rudd, of Hartford, Conn., disagreeing with the conclusions of the committee. Rather than use white for all clear he would go to the extent of using red glass in distant signals, as is done in England. He would then, if necessary, put a large white light on the post to distinguish the signal from a home signal.

Mr. H. M. SPERRY (National S. & S. Co.) spoke in favor of the use of green or all ear. He explained the construction of a lamp made by Saxby & Farmer, which is something like the two-face lamp used on the Chicago & Northwestern. Saxby & Farmer's device has not come into general use, however. Mr. Sperry believed that the cost of changing signals now in use so as to show green for all clear would not be so great as had been supposed. The ordinary semaphore casting costs $2.25, the Chicago & Northwestern type only 75 cents more. The combination lamp costs $4, which is 75 cents more than for an ordinary lamp. The speaker intimated that some people who thought they made lamps for much less than these figures were not sure whether they were getting their money's worth. He estimated that on the New York Division of the Pennsylvania road, with 1,100 signals, the lamps could be changed for $5,000, to which it would be necessary to add about $1,000 for changing glasses in switch lamps. Roughly speaking, all the signals on the Pennsylvania east of Pittsburgh could be changed for from $30,000 to $50,000. Many railroads could make all the changes necessary for $5,000 each. Continuing, he said: "When we consider that it is the opinion of many that this change will have to be made some day, I think it is about time to think about it and make some preparations for it. I am informed by reliable authority that one of the strongest reasons why the American Railway Association did not indorse the use of the green light was due to the influence of the Pennsylvania Railroad. We have made great efforts in every other direction to perfect our interlocking appliances, and now we are at the mercy of a broken glass. As to the use of wire glass—manufacturers of this kind of glass are doing such a large business in making skylights that they do not care about making a few signal glasses for railroads, and it will probably be three or four years before they will make any effort to turn out railroad signal glass with wire netting incorporated therein.

Mr. SPICER spoke in favor of strengthening colored glasses with wire netting. and by making them thicker, and continuing the present system.

Mr. ELLIOTT (C., M. & St. P.) was satisfied to stick to white for all clear, though he spoke favorably of the Chicago & Northwestern plan. That road now puts a red lens in the lamp instead of using a plain [thin] red glass in the spectacle. It was found that "on account of the thickness of the spectacle casting, snow would collect on the rim and blot out the light and give a clear signal, and it has done that in two instances, one on our road and one on the C. & N. W."

Mr. MILES (M. C.) thought the club should not recommend the present practice simply on the ground that a change would be costly. The question of expense should be left to the general managers. He had known of cases where broken glasses were discovered which seemed to have been broken for at least two weeks, the signal having been seldom operated and the glass not frequently inspected. Such a case may come up on any road, and as the committee thinks the Carter light practicable why recommend the continuance of white?

Mr. SPERRY agreed with Mr. Miles that the question of cost should be left to the managers. Signal engineers should feel the great responsibility resting upon them to provide safe appliances. The fewer signals you have the greater pains should be taken to get the best, as inspection is less frequent and careful.

Mr. ELLIOTT offered a resolution declaring the present general practice the best, but it was voted down and the question of making any recommendation was then ordered submitted to a letter ballot.

The Committee on Rules submitted a code of regulations for the operation and maintenance of interlocked signals, which will be discussed at the May meeting.

## A Ride on a Compound Locomotive.

A ten-wheel compound locomotive built by the Richmond Locomotive Works has been hauling freight on the Southern Railway for several months, and has recently been assigned to a regular passenger run between Danville, Va., and Charlotte, N. C. The engine leaves Danville at 5 o'clock in the morning, hauling a train that, upon the occasion of which we are writing, consisted of four sleeping cars, a day coach, a baggage and a mail car, or seven in all.

As the engine backed down to take the train at the Danville station, the steam gage indicated 195 lbs. and the furnace door was on the latch. Leaving Danville for the south there is an up-grade for a couple of miles or more, but there was no trouble experienced in starting the train, and gradually increasing the speed until the head of the grade was reached. The pressure fell to 185 lbs. and vibrated between that point and something more than 200 lbs. all of the way to Charlotte. Once it dropped to 170 lbs. for a few minutes just after the fireman had sliced and cleaned his fire. In short the engine showed that the boiler had ample capacity to supply the demands of the cylinders. While there were some variations in pressure the pointer was very steadily kept in the range of from 185 to 195 lbs.

If any one of those who think that the compound locomotive is always a matter of careful solicitude, and is favored in a way that the simple engine is not, would take this ride from Danville to Charlotte, his delusions in this respect would be dispelled. Neither in the firing nor the use of the injector is there any apparent difference in the treatment of the engine. The firing is kept up at approximately even intervals, just as we find it wherever the fireman has any regard for his own back and the coal pile of the company. In this instance the injector was used at regular intervals and always full on. The water was allowed to fall until steam just began to show at the second gage; then the injector would be started and the water level raised to the third gage, when the feed was stopped and the water allowed to fall again. This was done with an absolute disregard to the profile of the road, which, though not showing any very severe grades, is sufficiently undulating to permit an engineer to favor his machine had there been any necessity for so doing.

Our readers are aware that in the Richmond compound there is an emergency attachment to the intercepting valve, whereby, in cases of necessity, that valve can be held open and the engine be run single expansion. There was no necessity for any use of this attachment upon the run we are considering. Three starts were made, at Danville, Greensboro and Salisbury. In each instance the reversing lever was simply thrown down in the corner and the throttle carefully opened as in the case of the simple engine, and then, as the speed was increased, the reverse lever was drawn back until the cut-off was at about 8 in , and this may be taken as the point of average cut-off during the whole run. There was nothing to indicate to the casual observer that he was near a compound locomotive except the softness and infrequency of the exhaust. The throttle was sometimes wide open and sometimes partially closed so as to wire-draw the steam; but that the engine was to be coddled was the last thing that would have entered the mind of either the engineer or fireman Their sole idea was to get over the division on time, but they did think enough of the working capacities and possibilities of the machine for the engineer to express his regrets that we were not behind time so that he would have a chance to do some fast running.

But unless the compound can show a coal saving, the mere fact that it can be handled with the same ease as a simple engine will not serve to introduce it. The impression made upon the mind of the observer after having ridden over the same road on simple engines of the same general construction, and hauling trains of the same weight, is that this engine does save coal. On the simple engine it seemed that there was an incessant shoveling of coal only relieved by a slicing of the fire, while on this run the fireman appeared to be anything but overworked: he could climb to his seat for a rest; he could stand between the cab and the tank and look abroad, and at all times he appeared to be the master and not the slave of the situation. There was never any feverish watching of the steam gage, or an evidence of that nervous anxiety that is so commonly manifested where the fireman sees the steam pressure falling and feels that his best efforts are unavailing to check it. In short this fireman appeared to be taking matters easily; and that he did take it more easily than his mate on the simple engine is evidenced by the fact that the latter burns all of the coal that is put upon his tank, while the former had about a ton and a half or so to spare at the end of the run. The time occupied in the run is three hours and a half, th distance is 142 miles, and the saving in the shoveling of a ton and a half of coal makes the difference between a leisurely attention to the furnace and a nervous driving of the same to get all of the fuel burned that is possible.

In order that the mere impression of an observer upon the locomotive might be corroborated or upset by the coal records, an inquiry into the matter showed that this compound burned 81.57 lbs. per train mile and a simple engine built after the same designs, and hauling exactly the same trains on alternate days, burned 95.42 lbs., showing a saving of nearly 15 per cent. in favor of the compound.

Incidentally it may be mentioned that the engine is a very easy riding one. There is no apparent difference between the two sides and the counterbalancing is excellent.

Much has been said of the prejudice existing against the compound, and failures have been attributed to this. That there may be such a prejudice is not denied, but it seems probable that timidity is the real cause. Engineers must necessarily be a cautious class of men, and when they are put upon a locomotive which they know works upon a different principle from that to which they are accustomed, they are not disposed to try any experiments. Hence we find a man coming to a full stop after having worked his engine as a simple upgrade because he was not sure that it would be safe to close the emergency valve and reconvert to a compound while in motion. They are anxious about accidents and want to know about blocking and running single-sided, lest they make a mistake and cause a disaster. The men who have designed the compound forget that the men who are to run them must be taught a new lesson, and until that lesson has been learned they avoid the new engine as an unknown quantity with vast capabilities for mischief. But when they have mastered the lesson, and the fireman finds that he has less coal to shovel, and the engineer that his new machine is as easily handled as the old, the new device becomes popular with the men, and such has been the history of the engine under consideration.

There are two of these engines on the Southern Railway, Nos. 321 and 322; they are 10-wheelers, with the following principal dimensions:

| | |
|---|---|
| Total weight in working order | 134,600 lbs. |
| Weight on drivers | 106,600 " |
| " trucks | 28,000 " |
| Total wheel base | 22 ft. 9 in. |
| Rigid " " | 12 ft. |
| Total " " engine and tender | 48 ft. 2¾ in. |
| " length of " " | 58 ft. 4⅝ in. |
| Diameter of H. P. cylinder | 20 in. |
| " " L. P. " | 32 in. |
| Stroke of piston | 24 in. |
| Kind of piston packing | Cast iron rings. |
| Diameter of piston rod | 3½ in. |
| Size of H. P. steam ports | 1¼ in. × 23 in. |
| " L. P. " " | 1½ in. × 23 in. |
| " H. P. exhaust " | 3 in. × 23 in. |
| " L. P. " " | 3½ in. × 23 in. |
| Greatest travel of H. P. valves | 5½ in. |
| " " L. P. " | 6 in. |
| Outside lap of H. P. " | 1 in. |
| " " L. P. " | 1¼ in. |
| Inside clearance of H. P. " | ⅛ in. |
| " " L. P. " | ⅜ in. |
| Lead in full stroke of H. P. " | ¼ in. |
| " " L. P. " | ⅛ in. |
| Diameter of driving wheels | 66 in. |
| " truck " | 30 in. |
| Size of driving axle journal | 8 in. × 8¾ in. |
| Size of truck axle journal | 5⅜ in. × 9¾ in. |
| Size main crankpin journal | 6 in. × 5 in. |
| Description of boiler | Wagon top. |
| Diameter of boiler, smallest ring | 58 in. |
| Material of boiler | Steel. |
| Thickness of plates in boiler barrel | ⅞ in. |
| " " " firebox shell | ½ in. |
| " " " sides, back, end and crown of firebox | ⅜ in. |
| " tubesheets | ½ in. |
| Kind of horizontal seams | Double butt straps. |
| " " circumferential seams | Double lap. |
| Material of tubes | Charcoal iron. |
| Number " " | 252 |
| Outside diameter of tubes | 2 in. |
| Length of tubes over tubesheets | 12 ft. 9½ in. |
| Inside length of firebox | 8 ft. 1 in. |
| " width " " | 3 ft. 5⅞ in. |
| Depth of firebox from crownsheet to bottom of mud ring | 63½ in. |
| Water spaces, sides and back | 3½ in. |
| " " front | 4 in. |
| Crownsheet stayed with | Radial stays |
| Diameter of dome | 32½ in. |
| Height " " | 26 in. |
| Steam pressure | 195 lbs. |
| Kind of grate | Rocking |
| Grate area | 28 sq. ft. |
| Heating surface in firebox | 134 sq. ft. |
| " " " tubes | 1,684 sq. ft. |
| Total heating surface | 1,818 sq. ft. |
| Height from top of rail to top of stack | 15 ft. 4¼ in. |
| Weight of tender empty | 38,300 lbs. |
| " " " with coal and water | 89,000 lbs. |
| Tender wheels, diameter | 33 in. |
| " axles | Hammered iron. |
| Size of tender axle journals | 4 in. × 8 in. |
| Water capacity of tender | 3,800 gals. |

## The Strength of Boiler Flues.*

The following is the result of tests on boiler flues, performed at the Imperial Docks at Danzig during the years 1887 to 1892:

There was published about the middle of 1893 under the title "Versuche, betreffend die Festigkeit cylindrischer Feuerruagen, ausgeführt auf der Kaiserlichen Werft in Danzig," matter which could not be otherwise than extremely interesting and valuable to engineers; for it referred to parts of boilers of which we possess but scanty knowledge, and that is based on grounds rather doubtful because largely conjectural.

Fairbairn's experiments, from which all formulæ have hitherto been deduced, were performed for the most part with thin flues, for 26 of the 31 flues tested were only about $\frac{3}{4}$ in. (1.1 mm.) thick, but 1 being as thick as ¼ in. The minimum thickness of boiler flues to-day is .275 in. (7 mm.), and increase from that to .945 in. Again Fairbairn's flues were from 4.015 in. to 18.75 in. diameter, while to-day flues range from 23.63 in. to 68 9 in. (1,750 mm.), and they were not tested under conditions to which boiler flues are subjected. All of this tends to show that the results of his experiments cannot properly be applied to the present practice of larger flues and much higher pressures.

The sanction of naval practice even cannot justify the use of the old formula $s = \sqrt{\frac{p d l}{c}}$ for the thickness ($s$) of boiler flues in which $p$ = maximum working pressure, $d$ = diameter of flue; $l$, its length, which depends on considerations of stiffness, etc., and $c$, a constant. Write this formula in the form $p = \frac{cs^2}{d\,l}$. Now for $l = \infty$ $p = o$; that is to say, a thick tube even of very small diameter can be made long enough to fail under any small pressure; or, conversely, short lenghts of very little thickness can sustain extraordinarily high pressure.

The experiments herein treated were performed with 18 boiler flues, of which 13 were straight tubes, .295 in. (7.5 mm.) to .59 in. (15 mm.) thick and from 37.4 in. (950 mm.) to 39.37 in. (1,000 mm.) diameter, four corrugated and one ribbed flue. Presumably the flues had never been used in actual service.

Figs. 1 to 3 show parts of the apparatus which consisted of a cylinder or pressure box of Martin steel 51.967 in. (1,320 mm.) diameter. End plates were fitted to the flanges of the cylinder and held by 52 1½-in. steel screws through an outside clamp ring 5 in. broad, which helped to stiffen the joint. To these end plates the flues to be tested were riveted as shown in the various cuts. Red lead cement was generally used in the joints, four days being required to set it. In a few experiments rubber rings with wire gage centers had to be used. Each flange bolt was wrapped with hemp and red leaded.

The device for measuring the inner diameter of the flue consisted simply of a bronze tube, Fig. 1, placed concentric with the flue and capable of being revolved through a distance indicated by the graduated disc seen in Fig. 3. On this bronze tube inside calipers $c$ perpendicular to its axis were carried back and forth by a screw $b$, turned by a hand crank. The extension of the caliper points was measured by a vernier to .004 in. (.1 mm.).

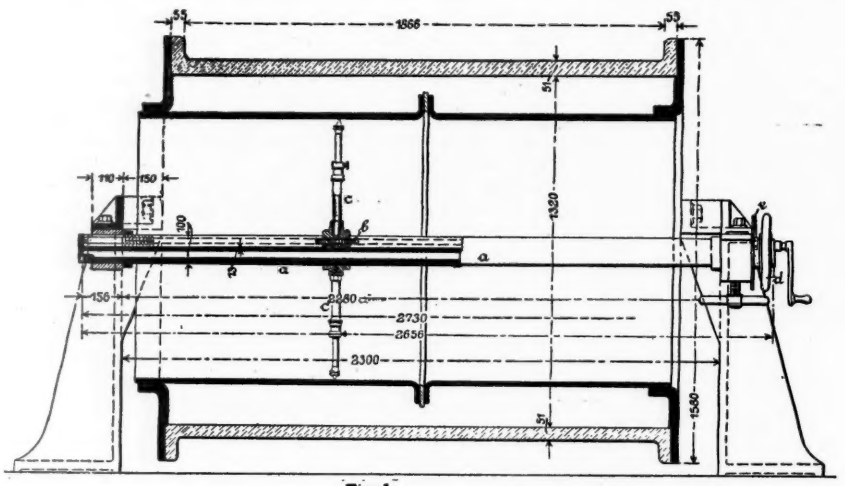


Fig. 1.

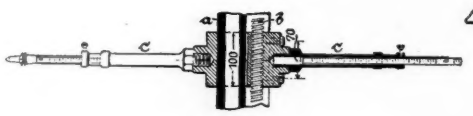


Fig. 2.

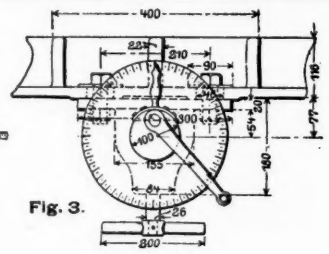


Fig. 3.

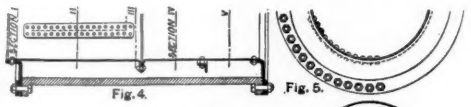


Fig. 4.


Fig. 5.

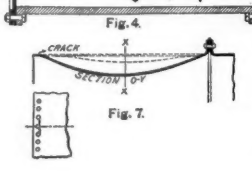


Fig. 7.

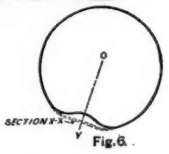


Fig. 6.


Fig. 8.

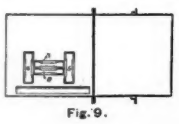


Fig. 9.

Hydraulic pressure was exerted in the space between pressure box and flue and gradually increased; measurements of the deflections being taken at intervals of 5 kilog. (71 lbs.) pressure. Two manometers on the cylinder served to indicate the pressures. As soon as a flue began to fail the pressure fell. It was increased then until leaks, deformation or rupture stopped the test altogether.

The author in his "Maschinenelemente" has presented the following formulæ [here translated into English units] for boiler flues of this type:

$$(1)\qquad p = 142.23\,\frac{\left(\frac{100s}{d}\right)^2}{\frac{100s}{d} + \frac{a}{40} \times \frac{1}{1+\frac{d}{l}}} \text{ and}$$

$$s = \frac{p\,d}{5{,}080}\left(1 + \sqrt{1 + \frac{a}{p} \times \frac{1}{1+\frac{d}{l}}}\right) \text{ in which}$$

$p$ = maximum working pressure in pounds per square inch.

$s$ = thickness in inches.

$d$ = diameter in inches. (When $s$ is very small compared with $d$, $d$ can be inside diameter.)

$l$ = length of flue, which depends on considerations of stiffness, etc.

$a$ = a constant which depends more or less on the perfectness of the cylindrical form of the flue, and which in good practice has a value 80 for flues whose longitudinal joints are welded or closed by a butt joint with double strap, single row of rivets.

A fuller description than the table affords of the action in the test of each of the straight flues will now be given, reference being made to the different cuts which illustrate the final effect on the flues.

Flue No. 1, Figs. 4 to 9. Figs. 4 and 5 show tube No. 1 divided into two lengths, flanged and riveted together, set in the testing cylinder. Each length had a longitudinal joint closed as described in the table.

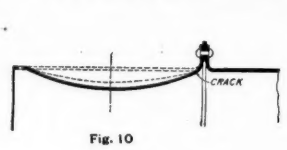


Fig. 10.


Fig. 11.

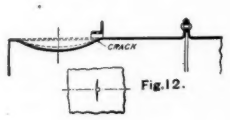


Fig. 12.


Fig. 13.

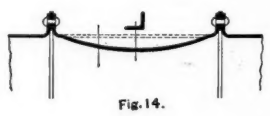


Fig. 14.


Fig. 15.

Fig. 16.

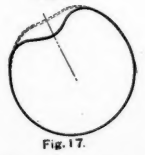


Fig. 17.

The maximum differences in diameters at different sections of the flues given in the table are indicators of the amount of deviation from perfect cylindricity. To secure a circular section at section 1 was comparatively a simple matter, because of the turned hole in the end plate. The forming of the flanges near sections 3 and 4 caused the principal deviations. The additional stiffening afforded by these flanges, however, more than compensated for the loss of strength possessed by a perfect cylinder exposed to an uniform pressure; collapse never

* Translated and condensed from the German by Mr. W. W. Nichols, M. E., Instructor in Mechanical Engineering, Yale University.

occurred near these sections. In tube No. 1 bulging suddenly, began near section 2 under 340 lbs. pressure (shown dotted in Figs. 6 and 7), and the pressure fell to 114 lbs. By further pumping a pressure of 242 lbs. was reached, when the bulge developed to the extent shown in the cut and the cross crack shown in Fig. 7 appeared.

The greatest set deflection before bulging began occurred under 284 lbs., and was not in the section which finally collapsed.

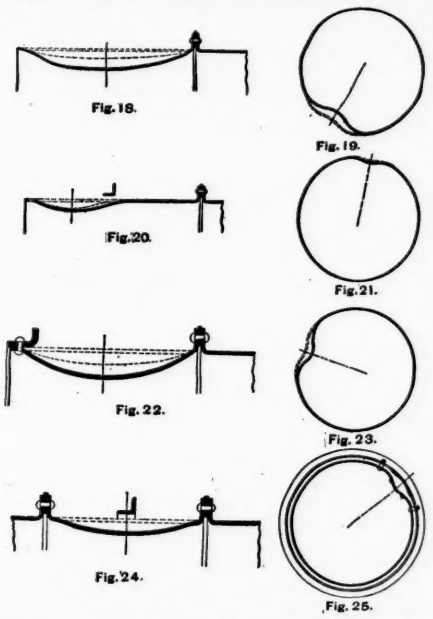
A tensile test was made of four strips cut from the sheet out of which the flue was rolled, and of four cut from the collapsed flue (see Figs. 8 and 9) and flattened cold by hydraulic pressure. The mean of the results of this test of the first four are entered in the table under "Tensile Test." For flue No. 1, $s = .326$ in., $d = 39.37$ in., $l = 41.81$ in., therefore $p = 52.6$ lbs. Comparing this with the collapse pressure, 340 lbs., it is seen that the formula affords a factor of safety in this instance of 6.48.

Flue No. 2 was divided into three lengths, instead of two, as No. 1, and had two collapse rings instead of one. The manner in which it yielded is shown in Figs. 10 and 11. The bulge shown dotted in Figs. 10 and 11 formed under 427 lbs., the pressure immediately dropping to 142 lbs. Under further pumping the bulge gradually increased until at $p = 284$ lbs. a cross-crack (Fig. 10) appeared in the throat of the flange. The greater strength of this flue, as compared with No. 1, may be due to its more perfect form.

Flue No. 3 was divided into two lengths, and had two collapse rings, Figs. 12 and 13. After sustaining a pressure of 427 lbs. for about 4 minutes the tube bulged as shown dotted in Figs. 12 and 13, and the pressure fell to 299 lbs. The bulge then gradually developed under increasing pressure until at 355 lbs. a cross-crack occurred at one of the bolts of the collapse ring, and the pressure sank to 0. The short bend over the bolt head which the sheet experienced here undoubtedly had much to do with this rupture.

Flue No. 4 was divided into three lengths, and had three collapse rings, Figs. 14 and 15. 427 lbs. was sustained in this case, 3 minutes before a bulge appeared between two bolts of a collapse ring (Fig. 15). The pressure then fell to 398 lbs. The bulge afterward increased with the pressure until 455 lbs. was reached, when the heads of both bolts flew off and the pressure sank to 0. This experiment demonstrated one of the objections to collapse rings. As long as the staybolts support the flue at intervals around it, an opportunity will be afforded to distort its true cylindrical form into a prismatic form—in this case of 22 sides—and collapse, then becomes comparatively easy. Therefore the smaller the pitch of these bolts the better it would be, if it were not that such a condition will reach a point when a serious interference with free circulation of water would arise with its resultant evils, rapid deposition of impurities, etc. The author has already considered this in his "Maschinenelemente" where he recommends the omission of collapse rings whenever practicable.

Flue No. 5 was in one length, and had no collapse rings. Figs. 16 and 17. Bulging began at 455 lbs. pressure, which then sank to 177 lbs. Rapid pumping raised the pressure to 185, the bulge increased and cross-cracks




formed at the joint between flue and end plates. It is to be noted, that the greatest deviation from circular form —.232 in. in 39.37 in.—occurred in the cross-section where bulging commenced.

Flue No. 6 was in two lengths with one collapse ring, as No. 1, Figs. 18 and 19. 640 lbs. was sustained fully a minute before bulging began, then pressure sank to 242 lbs. The bulge developed under 412 lbs. until finally two rivet heads flew off from the circumferential joint at one of the end plates.

Flue No. 7, similar to No. 3, Figs. 20 and 21.

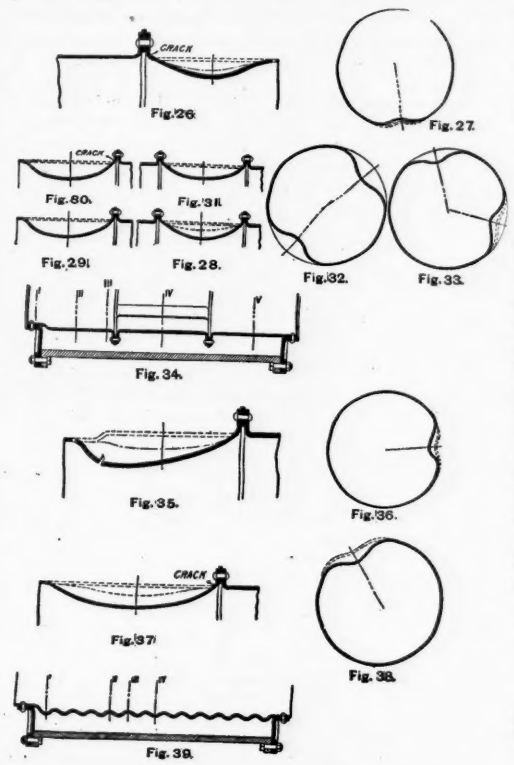
Bulging began at 640 lbs., between two stay bolts, and pressure fell to 427 lbs. This bulge increased under 512 lbs. until the head of one of the bolts flew off.

Flue No. 8, similar to No. 2, Figs. 22 and 23.

After two minutes of a pressure of 640 lbs. bulging began, the pressure sinking to 313 lbs. The bulge increased under the former pressure until a rivet head flew off.

Flue No. 9, similar to No. 4, Figs. 24 and 25.

After sustaining 782 lbs. some three minutes this flue began to bulge in the middle section. At first the pressure fell to 640 lbs., then a little later to 455 lbs., and finally, on account of leaks which had developed, to 0.




By energetic pumping a pressure of 455 lbs. was again reached, when the heads of two staybolts flew off. Attention is directed to the bending of one of the collapse rings, whose dimensions were 2.95 in. × .511 in.

Flue No. 10 was in three lengths with no collapse rings, Figs. 26 and 27.

(Test piece No. 5, cut out crosswise at the point of collapse, was .496 in. thick and parted in the weld under a tension of 41,246 lbs. per square inch.)

When 711 lbs. had been reached leaking became so considerable around the flange ring that it had to be hammered tight; then 782 lbs. was reached and sustained 10 minutes before a bulge formed at the weld and the pressure sank to 640 lbs. The bulge was increased under 811 lbs., when the cross-crack shown in Fig. 26 appeared.

Flue No. 11, similar to No. 10, Figs. 28 to 33.

At 683 lbs. the bulge in Fig. 28 formed in the middle section and the pressure fell to 398 lbs.

At 711 lbs. the bulge in Fig. 29 formed in the left section, the pressure falling to 427 lbs.

At 725 lbs. the bulge in Fig. 30 formed in the left section, pressure falling to 427 lbs.

Another raise to 725 lbs. produced the bulge in Fig. 31 in the middle section, pressure then falling to 427 lbs. After renewing some of the rivets and hammering some of the joints tight the pressure was raised to 768 lbs., when a cross-crack (Fig. 30) formed.

Flue No. 12, Figs. 34 to 36.

The left section in this flue was drawn in at its end from 37.4 in. to about 33.04 in., inside diameter. Set was first detected at about 569 lbs.

At 1,138 lbs. the bend at the contraction straightened out and the pressure fell to 640 lbs. This pressure was increased to 853 lbs., the bulge enlarged and a cross-crack formed as shown in Fig. 35, very close to where the metal had been strained by drawing.

Flue No. 13 was in two lengths with no collapse rings, Figs. 37 and 38.

At 996 lbs. a bulge formed, pressure sinking to 398 lbs. After leaks had been stopped the pressure was raised to 569 lbs., the bulge increased and a flange crack resulted.

Flue No. 14, Figs. 39 to 41.

A Schulz-Kuandt corrugated flue of Siemen's-Martin steel. Thickness about .511 in. A tensile test of pieces cut from the end of the flue gave the following:

Ultimate stress ($K_2$) ..... { Fiber-wise ($a$), 53,050 lbs. per sq. in. / Cross-wise ($b$), 53,760 lbs. per sq. in.

Percentage of elongation ($\varphi$) { Fiber-wise ($a$), 36.7 per cent. / Cross-wise ($b$), 31.3 per cent.

Pieces taken from the collapsed section and straightened cold under hydraulic pressure gave

| $K_2$ | | $\varphi$ | |
|---|---|---|---|
| ($a$) | ($b$) | ($a$) | ($b$) |
| 74,525 lbs. | 74,526 lbs. | 28 7 per cent. | 28.1 per cent. |
| 81,070 " | 75,529 " | 29 " " | 28.1 " " |

At 924 lbs., after sustaining this pressure for 15 minutes, the bulge, dotted in Figs. 40 and 41, formed, pressure then falling to 683 lbs. at first, and decreasing later Pressure was again raised to 626 lbs., but as the bulge enlarged by the corrugations spreading out only 299 lbs. could be maintained. In this test no rupture whatever occurred.

The external pressure of 924 lbs. corresponds to a compressive stress in the metal of about $\frac{41.34 \text{ in.} \times 924}{2 \times .511} =$ 37,400 lbs.

As this is about the crushing strength of the material experiment rather confirms conjecture in that the collapse load of corrugated flues of proper form, is equal to the crushing load of the material of which they are made.

Flue No. 15, Figs. 42 and 43. Same style as No. 14. Thickness about .571 in.

This steel was not so tough, as the following results show:

Before the test.

| $K_2$ | | $\varphi$ | |
|---|---|---|---|
| ($a$) | ($b$) | ($a$) | ($b$) |
| 59,000 lbs. | ..... | 25.5 per cent. | ..... |
| 57,000 " | ..... | 27. " " | ..... |

After the test.

| | | | |
|---|---|---|---|
| 72,500 lbs. | 77,090 lbs. | 7.8 per cent. | 6 per cent. |
| 60,150 " | 72,100 " | 21.8 " " | 9 " " |

At 996 lbs. a bulge began, with a sudden drop in pressure to 569 lbs. The left end of the flue, which was not corrugated, evidently gave way first (see Fig. 42)—that is, in this case the collapse pressure was less than the crushing strength of the material of which it made. And the crushing strength here was greater than in the preceding, for ductility was less.

Equation (1) gives for this uncorrugated section with $l = 13.58$ in., $s = .571$ in., $d = 37.4$ in., and $a = 80$, $p = 161$ lbs., and therefore affords a factor of safety of 6.18, which agrees closely with the values obtained elsewhere for the other flues.

After stopping some leaks pressure was raised to 924 lbs., the bulge increased and pressure again sank. Finally, under 512 lbs., a cross-crack appeared.

Flue No. 16, Figs. 44 and 45. Same as No. 15, with a thickness of .63 in.

The tensile test gave:

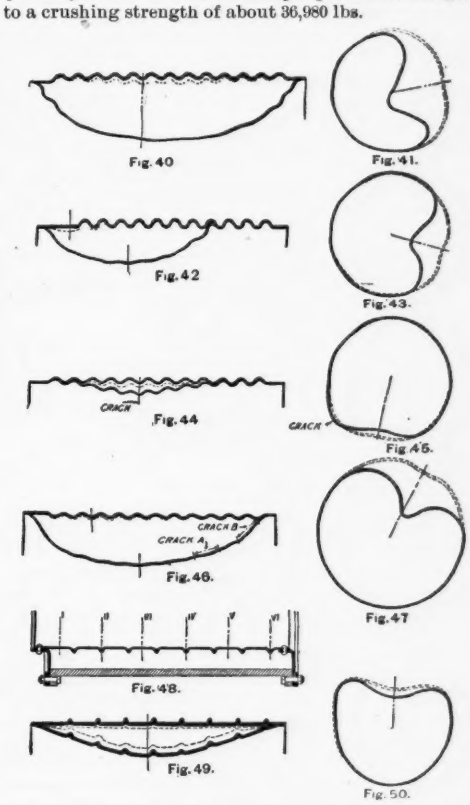
Before the test.

| $K_2$ | | $\varphi$ | |
|---|---|---|---|
| ($a$) | ($b$) | ($a$) | ($b$) |
| 55,470 lbs. | 55,470 lbs. | 30 5 per cent. | 24.5 per cent. |
| 53,193 " | 54,330 " | 31 5 " " | 23.5 " " |

After the test.

| $K_2$ | | $\varphi$ | |
|---|---|---|---|
| ($a$) | ($b$) | ($a$) | ($b$) |
| 75,520 lbs. | 68,270 lbs. | 4. per cent. | 5.8 per cent. |
| 72 680 " | 68,270 " | 6.5 " " | 7. " " |

A pressure of 1,067 lbs. (75 kg.) had been sustained three minutes, when bulging began and developed to the extent shown in Fig. 44, pressure sinking to 868 lbs. After stopping leaks 640 lbs. was again reached, the bulge enlarged and a longitudinal crack formed, apparently in the weld. This collapse pressure corresponds to a crushing strength of about 36,980 lbs.




Flue No. 17, Figs. 46 and 47. Same as No. 16, with a thickness of .67 in.

The tensile test gave:

Before the test.

| $K_2$ | | $\varphi$ | |
|---|---|---|---|
| ($a$) | ($b$) | ($a$) | ($b$) |
| 52,900 lbs. | 51,770 lbs. | 23 per cent. | 31.5 per cent. |

After the test.

| $K$ | | $\varphi$ | |
|---|---|---|---|
| ($a$) | ($b$) | ($a$) | ($b$) |
| 69,120 lbs. | 59,300 lbs. | 9 per cent. | 12 per cent. |
| 59,450 " | 70,250 " | 11 " " | 7 " " |

After sustaining 996 lbs. two minutes the flue bulged to the extent dotted in Figs. 46 and 47, pressure sinking to 853 lbs. Some leaks having been closed the pressure was raised to 782 lbs., the bulge enlarged, a rivet broke and the two longitudinal cracks in Fig. 46 formed.

The collapse pressure in this case corresponds to a crushing strength of 36,550 lbs.

Flue No. 18, Figs. 48 to 50.

A ribbed flue from John Brown & Co., Sheffield. Thickness, .551 in. The tensile test gave:

Before the test.

| $K_2$ (a) | $K_2$ (b) | $\varphi$ (a) | $\varphi$ (b) |
|---|---|---|---|
| 60,160 lbs. | 63,860 lbs. | 23.5 per cent. | 15 per cent. |
| 58,690 " | 64,710 " | 26.5 " " | 13 " " |

After the test.

| $K_2$ (a) | $\varphi$ (a) |
|---|---|
| 63,290 lbs. | 9 per cent. |
| 59,880 " | 26 " " |
| 60,300 " | 15 " " |
| 60,590 " | 29 " " |

Bulging began at 853 lbs. pressure, sinking to 299 lbs. before it stopped. Ultimately a long cross-crack formed under the latter pressure. (See Figs. 49 and 50.)

The collapse pressure in this case corresponds to a crushing strength of about 29,870 lbs.

The flues for air are shown by the dotted lines in Fig. 1 and open into the furnace near the point of combustion. The air is sufficiently superheated by coming in contact with the heated lining walls of the furnace and is controlled by sliding doors at the entrance of each flue. This makes a very simple furnace with no complicated parts or expensive machinery, and it is said to give excellent results.

Among the claims made for it are: It is adapted to metal working in all the various branches of melting, puddling and heating, and it can be constructed under any boiler or battery of boilers either longitudinally or vertically.

For glass-house works it is particularly valuable. Actual practice has demonstrated a saving of 90 per cent. in fuel, giving an unlimited degree of heat, which has proven that it is very economical in the use of coal,

On all sums of $5 and upward that have been on deposit not less than three calendar months, interest will be paid at the rate of 4 per cent. per annum from the first day of the month succeeding that in which the deposit was made.

In addition to that guaranteed interest, the Committee of Directors in charge of the Relief Department may, in their discretion, after the close of any fiscal year, grant dividends to the depositors from the net earnings of the Savings Feature in proportion to the interest credited to their respective accounts that year.

A depositor who quits the service of the road may retain his privileges as such if he then have a balance to his credit of not less than $50; otherwise his account must be finally closed out within 30 days of his departure from the employment of the company.

Any adult employee of the road, who is a member of

RESULTS OBTAINED FROM THE TEST OF THIRTEEN STRAIGHT TUBES.

| Flue No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | | | | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cuts | Figs. 4 to 9 | Figs. 10 and 11 | Figs. 12 and 13 | Figs 14 and 15 | Figs. 16 and 17 | Figs. 18 and 19 | Figs. 20 and 21 | Figs. 22 and 23 | Figs. 24 and 25 | Figs. 26 and 27 | Figs. 28 to 33 | | | | Figs. 34 to 36 | Figs. 37 and 38 |
| Material | Iron, first quality | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1. | Same as No. 1. | Same as No. 1. | Wroug't iron. | Siemens-Martin steel. | | | | Iron plate. | Iron plate. |
| Manufacturer | Borsig | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1. | Same as No. 1. | Same as No. 1. | Schuz-Knaudt. | Schulz-Knaudt. | | | | Grille, Funke & Co. | G. F. & Co. |
| Longitudinal joint closed by | End welding and in the middle, a butt joint, double strap, single row rivets. | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1 | Same as No. 1. | Same as No. 1. | Same as No. 1. | Welding | Welding. | | | | Same as No. 1. | Same as No. 1. |
| Inside diameter, in inches | 39.37 | 39.37 | 39.37 | 39.37 | 39.37 | 39.37 | 39.37 | 39.37 | 39.37 | 37.40 | 37.40 | | | | 37.40 | 39.37 |
| Max. difference in diameters before test, in inches. Cross-section I. | .102 | .146 | .098 | .110 | .185 | .055 | .157 | .051 | .079 | .268 | .071 | | | | .059 | .047 |
| " " " II. | .102 | .039 | .003 | .236 | .252 | .173 | .283 | .110 | .114 | .248 | .126 | | | | .051 | .075 |
| " " " III. | .248 | .252 | .090 | .240 | .193 | .071 | .063 | .087 | .098 | .157 | .102 | | | | .047 | .146 |
| " " " IV. | .220 | .197 | .224 | .181 | ..... | .067 | .091 | .201 | .122 | .134 | .063 | | | | .055 | .283 |
| " " " V. | .059 | .079 | .055 | .078 | ..... | ..... | ..... | .150 | .126 | .075 | .063 | | | | .161 | .078 |
| " " " VI. | ..... | .039 | ..... | .047 | ..... | ..... | ..... | .016 | .024 | .075 | .079 | | | | ..... | ..... |
| | | | | | | | | | | | Bulge A. | Bulge C. | Bulge D. | Bulge B. | | |
| Collapse load ($p_0$) pounds per square inch | 340 | 427 | 427 | 427 | 455 | 640 | 640 | 640 | 782 | 782 | 683 | 711 | 725 | 725 | 1,138 | 996 |
| Greatest change (set) observed in the radius of section affected before bulging began, in inches | 0.0 | .004 | .059 | .004 | .071 | .012 | .008 | .016 | .043 | .032 | .035 | .032 | .032 | .035 | .138 | .028 |
| The pressure producing this set, pounds per square inch | 284 | 356 | 356 | 284 | 427 | 569 | 569 | 569 | 711 | 711 | 640 | 640 | 640 | 640 | 1,067 | 824 |
| Thickness in inches determined by measurement | .307 to .331 | .283 to .315 | .295 to .331 | .283 to .319 | .425 to .464 | .413 to .453 | .409 to .441 | .417 to .441 | .425 to .457 | .488 to .520 | .484 to .492 | ..... | ..... | ..... | ..... | .579 to .598 |
| Thickness in inches determined from the weight | .327 | .295 | .319 | .307 | .450 | .449 | .433 | .429 | .445 | .508 | ..... | ..... | ..... | ..... | ..... | .594 |
| Thickness in inches determined in the section of collapse | .321 to .325 | .295 | .305 to .309 | .307 | ..... | .437 to .443 | .417 to .423 | .423 | .441 to .443 | .497 | .468 | .472 | .476 | .476 | .606 | .569 to .572 |
| Tensile test. Mean elastic limit in pounds per square inch. Fiberwise. | 23,254 | 24,890 | 24,040 | 24,180 | ..... | ..... | 23,258 | 22,760 | 21,330 | ..... | ..... | ..... | ..... | ..... | ..... | 24,590 |
| Tensile test. Mean elastic limit in pounds per square inch. Crosswise. | 26,240 | 29,940 | 25,600 | 24,890 | ..... | ..... | 25,670 | 23,470 | 22,760 | ..... | ..... | ..... | ..... | ..... | ..... | 23,470 |
| Tensile test. Mean ultimate load in pounds per square inch. Fiberwise. | 48,570 | 53,550 | 59,590 | 50 900 | 53,340 | 59,000 | 53,480 | 54 760 | 49,070 | 53,050 | 54,050 | | | | 55,900 | 51,490 |
| Tensile test. Mean ultimate load in pounds per square inch. Crosswise. | 56,180 | 59,950 | 56,960 | 54,690 | 52,620 | 57,390 | 54,900 | 54,050 | 53,340 | 56,750 | 52,200 | | | | 53,550 | 49,140 |
| Tensile test. Mean elongation in 7.87 in. in per cent. Fiberwise. | 27.5% | 22% | 22.6 | 23.5 | 21.3 | 24.35 | 24 | 23.5 | 24.5 | 27 | 30 | | | | 17.75 | 19.75 |
| Tensile test. Mean elongation in 7.87 in. in per cent. Crosswise. | 10.5% | 12.3% | 10.3 | 19.5 | 12 6 | 18.35 | 16.65 | 19 | 15 | 25 | 28 | | | | 10.5 | 13.5 |
| Length of section affected, between supports, in inches | 41.81 | 29.02 | 20.15 | 13.15 | 77.95 | 41.93 | 19.76 | 28.86 | 13.15 | 20.47 | 27.95 | 30.31 | 30.31 | 27.95 | 27.40 | 42.32 |
| Computed thickness, in inches | .327 | .299 | .315 | .307 | .449 | .449 | .429 | .429 | .445 | .497 | .476 | .480 | .484 | .484 | .606 | .587 |
| Working pressure $p$ by (1), in pounds per square inch | 52.6 | 51 | 61.5 | 67.5 | 75 | 85 | 96 | 87 | 111 | 123 | 108 | 107 | 109 | 111 | 152 | 124 |
| Ratio of $p_0$ to $p$ | 6.48 | 8.35 | 6.92 | 6.32 | 6.08 | 7.52 | 6.66 | 7.33 | 7.02 | 6.36 | 6.30 | 6.61 | 6.66 | 6.54 | 7.51 | 8.04 |
| Differs from mean ration of 6.92 | − .44 | + 1.43 | 0 | − .60 | − .84 | + .60 | − .26 | + .41 | + .10 | − .56 | −.62 | −.31 | −.26 | −.38 | + .59 | + 1.12 |

The comparative merits of corrugated and ribbed flues are well demonstrated by these tests.

CONCLUSIONS.

It is learned from the above that—

Strengthening flues by collapse rings which are united to the flue by staybolts or rivets in the usual manner, has its disadvantages.

Equation (1) affords a factor of safety of from 6.08 to 8.35, a mean of 6.92. Such a variation in the factor of safety can be accounted for by the effect of even a slight deviation from perfect cylindricity of the flue upon its strength.

As far as one can judge from the experiments, formula (1) furnishes a fairly safe and satisfactory means for computing the thickness of this class of boiler flues.

## The Powell Improved Furnace.

We illustrate herewith a heating furnace designed by Mr. Edwin Powell which is held to be a decided advance in furnace practice. Its principles can be applied to all classes of furnaces used in metal working, but the one here described is best adapted for a rolling mill for heating piles and billets.

In the illustrations Fig. 1 shows a section of the furnace and Fig. 2 sections through *A* and *B*. The principal features of the furnace are the fire wall, *A*, the bridge, or wall, above *B*, and the conduit, or space between them. The fire wall, *A*, is supported by a double arch and is about 30 in. high. *B* is a double arch, which is 13 in. high above the grate line, and supports the wall, or bridge, above it. The space between the fire wall and the bridge is 12 in., forming a conduit from over the fire wall and through *B* to the combustion chamber. The openings for draught being above the fire, the air naturally passes down through the fuel and out through the arches under *A*. The flame becomes incandescent near the bottom and the burnt gases pass out through these arches. The partially consumed gases and smoke which arise from the cooler part, or top of the fire, pass over the top of the fire wall and down through the conduit, where they mingle with, and are thoroughly consumed by, the highly heated gases which come from that portion of the incandescent fire at or near the fire bed. These gases, being co-mingled at *B*, pass into the combustion chamber, where they are met with a proper proportion of air, to cause immediate and perfect combustion of all gases before they are admitted into the metal-heating chamber, none passing into the smokestack unconsumed.

This plan is a natural down-draft, therefore the ash pit is made air tight, the draft being taken through the stoking door at *X* and the grate cleaning door below it.

and a saving of 40 to 60 per cent. can be made in ordinary practice.

The combustion is perfect and complete, thereby emitting no smoke and leaving a small residue with no accumulation of clinkers. The use of forced drafts is unnecessary, better results are obtained with natural down drafts, saving the cost of maintaining artificial draft appliances. This system can be applied to the present style of furnace at a cost in time and labor not to exceed that now in general use. It is well known that carbon and hydrogen are the elements meant when the ordinary term fuel is used, and oxygen is the agent by which they are made to give up their heat. They

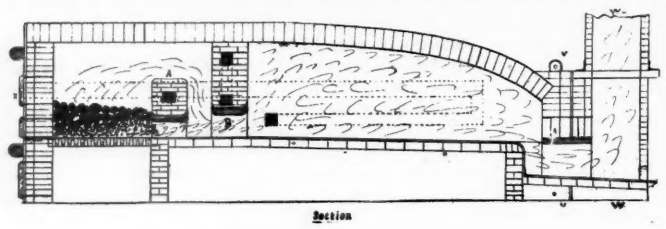



Fig. 1.

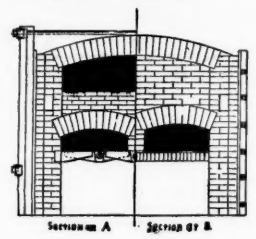



Fig. 2.

will combine in certain definite proportions only, and the combining elements must be in immediate contact and at a perfect temperature to produce combustion. One of the principal features of the Powell improvement is the arrangement of flues for the introduction of hydrogen into the furnace in the proper quantity and temperature at the proper time and place.

This furnace is made by the Powell Improved Furnace & Heating Co., of Pittsburgh, Pa.

## A Railroad's Relief Department.

*(Continued from page 199.)*

THE SAVINGS FEATURE.

Under the Savings Feature, any employee of the company, his wife, child, father or mother, or the beneficiary of any deceased member of the Relief Feature, may deposit with any depository designated by the B. & O. Railroad, any sum not less than $1, nor more than $100 in any one day, unless otherwise specially authorized by the Superintendent.

Parents or others may deposit in the name of any child, such deposit being subject to the order of the parent or other adult; and a minor may depost in his own name, subject, however, to the order of an adult.

the Relief Feature, and who has been continuously in the service not less than one year, may borrow from the Savings Feature sums not less than $100 at the interest rate of six per cent. per annum, charged from the first day of the month in which the loan is made.

Before the application for any loan will be submitted to the Committee of Directors, to whom belongs the decision to grant or to refuse it, the Superintendent must be satisfied that the money will be used to acquire or improve a homestead, or to free it from other debt, that the amount of the loan is not above three-fourths of the market value of the property offered as security, and that the service-record of the applicant is good.

The homestead must be adjacent to the B. &. O. Railroad, or one of its branches or divisions, within one mile thereof, unless located in a city through or into which the railroad runs.

The expense of obtaining an abstract of title, drafting necessary papers, recording deeds, etc., including a fixed charge of $5 for legal expenses in the department must be borne by the borrower.

No money will be paid directly to the borrower, but the Superintendent will, with the approval of the borrower, pay the purchase money of the property or discharge the liens or debt on it. No bills for labor or materials will be paid before the completion of the building or improvement, and then only when it is clearly shown that the amount of the loan is sufficient to free the property from all liens, debts or incumbrances of any kind, and that the value of the improved property exceeds by one-third the amount of the loan.

Every borrower must provide life insurance in the natural death benefit of the Relief Feature, to an amount equal at all times to his indebtedness to the Savings Feature in such manner that the benefits payable in case of his death may be available to discharge the said indebtedness. If the borrower cannot, under the regulations of the Relief Feature, obtain insurance

therein to the amount of his indebtedness, he must provide, in the same manner, insurance on his life in some regular life insurance company satisfactory to the Superintendent.

The borrower must also keep the improvements on the property taken as security fully insured against fire, in a company approved by the railroad, and must have the policy therefor so assigned as to protect the interests of the Savings Feature.

The borrower must promptly pay all taxes, assessments, public dues and charges levied upon the property taken as security. Should he fail to do so, the Superintendent may, if he thinks such failure likely to impair the security, pay the same and deduct the sum so paid, with legal interest, from the borrower's monthly payments, before crediting the latter upon the principal or interest of the loan.

The borrower must pay back the amount loaned to him in monthly installments at the rate of not less than $1.50 for every hundred dollars borrowed.

To secure the payment of the monthly installment, the borrower must execute an order on the railroad company authorizing it to apply monthly from his wages the amount so due, and this order must be held irrevocable during the existence of the indebtedness, and must constitute an assignment in advance to the company, that shall take precedence of all other claims, except the assignment contained in his application for membership in the Relief Feature.

A borrower, who earns no wages in any month, or who has left the service, must, at his own risk, keep up his payments.

If a borrower fails to pay the installments due for three months, or if he make default in the payment of any premium for fire or life insurance, or any tax, assessment or other necessary charge for a period of 30 days after the same becomes due, the whole amount of the principal sum and interest of his indebtedness to the Savings Feature shall become due and be collectible at the option of the Committee of the Directors on the Relief Department, and the Superintendent shall, if so directed by that committee, take all necessary steps to sell the property.

| | |
|---|---|
| The total deposits during the year ending June 30, 1895, were | $267,586.19 |
| The total deposits made since the Savings Feature was opened, up to June 30, 1895, were | 2,487,930.47 |
| The total amount loaned to borrowers up to June 30, 1895, was | 1,702,531.37 |
| The total amount loaned during the last fiscal year was | 175,689.02 |

The amount loaned to employees has been expended in building 838 houses, buying 782 houses, improving 174 houses already owned, and releasing liens on 365 houses.

During the five fiscal years before 1894–5 the Savings Feature paid depositors 5 per cent. interest. Last year it gave them 5½ per cent.

Its assets on June 30, 1895, were as follows:

| | |
|---|---|
| Outstanding loans | $639,425.77 |
| Interest accrued from B. & O. R. R. Co. | 5,462.23 |
| Printing press | 1,026 58 |
| Investments | 50,000 00 |
| Cash | 138,745.30 |
| Miscellaneous | 199 88 |
| Total | $884,859.76 |

Its liabilities on the same date were as follows:

| | |
|---|---|
| Due depositors | $856,042.74 |
| Relief Feature | 977.79 |
| Profit and loss | 23,168.31 |
| Miscellaneous | 247.11 |
| Unpaid checks | 4,423.81 |
| Total | $884,859.76 |

THE PENSION FEATURE.

The railroad company gives out of its own funds all the money used in the payment of pensions. Its contributions are designed:

First—To provide means of support during life for members of the Relief Feature, who, having served the company for 10 consecutive years and having reached the age of 65, are honorably relieved from duty.

Second—To provide in the same manner for like persons who, of their own accord, retire from the service.

Third—If there be any surplus left after the persons mentioned above have been pensioned it shall be applied to aid or support the most deserving and needy employees of the road who are members of the Relief Feature.

No person shall be entitled to wages from the company and to a pension allowance at the same time, or to benefits from the Relief Feature and a pension at the same time.

Pensions will be paid monthly. Each pensioner will receive a daily allowance, excluding Sunday, equal to one-half the benefits provided to be paid for sickness under the regulations of the Relief Feature to a member of the class to which the pensioner would, while in the service, have been assigned, had he been required to become a full member in said feature. In the case of a pensioner who has been continuously a member of the Relief Feature 15 years, this allowance is increased by the addition of five per cent.; and a like increase is made for every additional term of five consecutive years of membership.

This table shows in brief the amount of allowance made daily, except Sunday, to pensioners:

| | 10 years. | 15 years. | 20 years. |
|---|---|---|---|
| Those contributing under the Relief Feature to class A | $ .25 | $ .26¼ | $ .27½ |
| Those contributing to class B | .50 | .52½ | .55 |
| Those contributing to class C | .75 | .78¾ | .82½ |
| Those contributing to class D | 1.00 | 1.05 | 1.10 |
| Those contributing to class E | 1.25 | 1 31¼ | 1.37½ |

The company reserves the right to make a percentage reduction of all pensions at any time or to further limit the classes of persons to whom pensions will be paid by it.

The operations of this feature are shown in the following table:

| | | |
|---|---|---|
| Total number pensioned since Oct. 1, 1884 | | 413 |
| Number deceased since Oct. 1, 1884 | 175 | |
| Included in previous report, not finally approved | 20 | |
| | | 195 |
| Total number on list June 30, 1895 | | 218 |
| The payments to pensioners during the last fiscal year were | | $34,800.05 |
| The total payments to pensioners from Oct. 1, 1884, to June 30, 1895, were | | $273,054.37 |

CONCLUSION.

Taken altogether the Relief Department is of inestimable benefit to the company and to its employees.

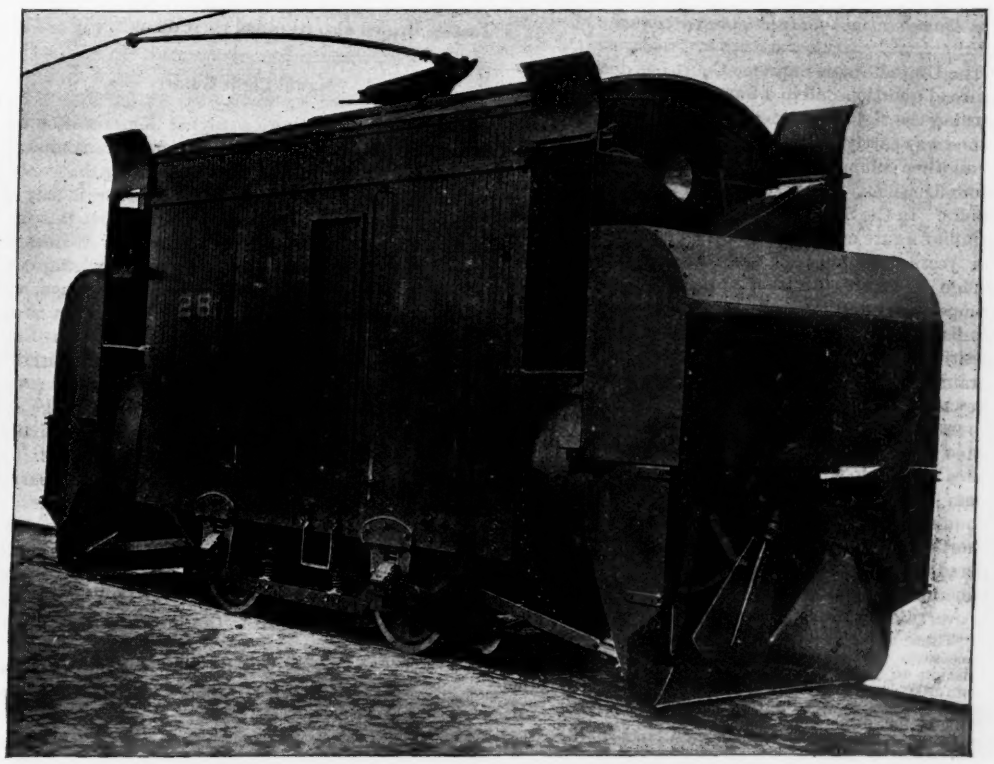
It saves the road anxiety as to what expenses the company should assume in case of accidents; it spares the company suits for damages from its employees; it attaches to the company a better class of employees.

It makes the employees frugal; it gives them the assurance that they will be taken care of in case of accident, and that their families will have some provision made for them in case of death; it encourages them to be thrifty; it helps them to get homes of their own.

It might wisely be imitated by other railroads, and by other corporations employing a large number of hands.

## The Rotary Snow Plow on Buffalo Street Railroads.

On March 20 we gave a short description of one of a number of rotary track cleaners used on the street railroads of Buffalo. We print now a reproduction from a photograph of one of these machines, eight or ten of which have been built. As will be seen, they consist of a short car having a rotary plow at each end. This car



The Ruggles Rotary Track Cleaner.

is mounted on trucks of the ordinary type and has four motors, two G. E. 800 type for propelling the car and two for driving the plows. A longitudinal axle through the car carries a plow wheel at each end. This axle is divided into three parts, the middle piece carrying two motors. This piece is connected at each end to the other section of the axle by a heavy clutch, the leading end being the only one in operation. The blades or cutters are mounted on an adjustable clutch and held in position by a heavy steel nut. There are four of these blades, each about 4 ft. long, of ⅝-in. steel. Just back of the front wheel is a second wheel of wood with radial blades covered with sheet iron. Both wheels are enclosed in a hood, as shown in the engraving. The former wheel as it turns forces the snow back into the paddles, which in turn throw it out of the hood 25 or 30 ft. clear of the track. The scoop shown in the engraving is adjustable, so that it may be raised to a height of 7 in. and dropped to within 1½ in. of the rails. The hood and deflectors are so arranged that the snow may be discharged on either side as desired.

The frame and body of the car are very strongly built. The flooring is so arranged that trap doors give ready access to the motors. These latter are controlled by $K_2$ controllers, and all of the operating mechanism is within easy reach of the motorman. Upon the Buffalo Railway it is customary to send three men out with this plow, but it can be handled by two. Mr. R. Dunning, Master Mechanic of the above road, informs us that the machine is very effective in snow from 8 in. to 5 ft. in depth, and that in some instances it has been driven through 8 ft. drifts. For suburban work and for streets or avenues not lined with residences Mr. Dunning thinks that this machine cannot be surpassed, but for thickly populated districts the scraper plow is preferable.

The machine, as we mentioned in the article of March 20, resembles somewhat the Leslie rotary snow plow, which has had extensive use in the West. It has been patented by Mr. George W. Ruggles, of Rochester, N. Y.

## Lubricating Rails on Curves.

The late Baron von Weber, just before his visit to America, communicated to the *Railroad Gazette* an account of some experiments on train resistance, which showed, among other things, that a car passing a curve encountered a resistance very slightly greater than on a tangent, provided the flanges of the wheels were lubricated. Apparently no one attempted to make any practical application of the lesson thus taught, though on those curves of the New York elevated railroads, which have a radius of 90 ft., the unassisted light of nature (or the difficulty of hauling a train through them otherwise) has led to the use of grease on the rails. Plumbago grease is used on the sharp curves, not only on the guard rails but on the track rails. The gage side of the outside rail is greased while it is new and rough to prevent squeaking; the flange side of the steel guard rails is always kept well lubricated.

Now comes Mr. W. Glanz, Manager of the Halberstadt & Blankenburg Railroad, and reports that ever since 1886 the lubrication of the inner side of the outer rails of curves has been practised on his road, introduced by his predecessor, Mr. A. Schneider. For this purpose it was found necessary to use a quick-drying material, which would not catch the dust, and thus serve to grind away rail and flange rather than to lubricate them. The company uses pure ground graphite mixed with water. It is applied with a long handled brush, the workman taking pains not to get any on the top of the rail, and applying it either with the side of the brush held perpendicularly, while he walks outside of the rail, or with the end of the brush held obliquely, while he walks between the rails. The minute wet particles of graphite adhere sufficiently long to the side of the rail head, and have a surprisingly favorable effect in reducing curve resistance.

On the lines of this railroad are about 15 miles of curves, the sharpest of 180 meters (590 ft.) radius, which is very sharp for four-wheeled cars. The favorable effect of the lubrication is shown by a great reduction in the wear of wheel flanges and of rail-heads. Before it was practiced, the tires had to be put into the wheel-lathe every four or five months, but from the day the lubrication was begun their wear became less than on ordinary lines in level districts. They now require turning only once in 18 months or two years; but this is partly due to the use of better steel.

The most notable effect of the lubrication has been on a section of Abt cog-wheel road, where the gage could be increased but little on a curve, without danger to the working of the cog-wheel.

The cost of the lubrication has been insignificant. No increase in the number of track hands has been required. In the last year reported 1,355 lbs. of graphite were used on the 15 miles of curves. Altogether, the cost is estimated at about $1.80 per mile of curve per year.

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## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The United States Supreme Court has decided four railroad questions, all in a bunch. The decision concerning the right of witnesses to refuse to give evidence was partly reported last week, and is discussed in another column in this issue. Now we have two more decisions, the first of which adjudicates two points. In the Social Circle case, which has been a familiar figure on the (traffic) stage for more than six years, the long-and short-haul law is upheld. Judge Newman's decision that transportation to a competitive point is always under circumstances dissimilar to those attending a shipment to a non-competitive point, and Judge Brewer's fanciful and strained construction of the term "line," which Judge Newman approved, are swept away. The Supreme Court declares that if a road participates in through rates from A to D, it must not refuse to make through rates from A to C; and it must not charge less to D than to C. In this case the Interstate Commerce Commission, besides its decision upon the long-and-short-haul section, in which it is now sustained, ordered a slight reduction in the rate on buggies from Cincinnati to Atlanta; and on this point its decision is overruled. The Supreme Court says:

"There is no provision in the act that expressly or by necessary implication confers the power on the Commission to fix rates. It was argued on behalf of the Commission that the power to pass upon the reasonableness of existing rates implied a right to prescribe rates. This is not necessarily so. The reasonableness of the rate, in a given case, depends on the facts, and the function of the Commission is to consider these facts and give them their proper weight. If the Commission, instead of withholding judgment in such a matter until an issue shall be made and the facts found, itself fixes a rate, that rate is prejudged by the Commission to be reasonable."

From which it would appear that the investigation made by the Commission was not sufficiently thorough or was not sufficiently set forth in its report. We must defer further comment until we receive the full text of the decision. The main feature of importance is that the long-and-short-haul clause of the law, which has been the subject of varied and persistent attacks, is now clearly sustained by the highest court in the land; and that the Interstate Commerce Commission, so long as its conduct is not unreasonable, will be backed up in enforcing it. The principle that a charge from Chicago to Albany must not be more than to Boston (although it may be as much) is now finally established in the law, and railroads desiring to take advantage of exceptions to it must prove the validity of the exceptions before the proper tribunal.

The other decision is on the well-known Texas & Pacific case, concerning rates on goods coming from Europe. This question also has been pending since 1889, the New York Board of Trade & Transportation having complained in that year that such goods were taken west at rates much lower than those demanded of New York shippers. The Interstate Commerce Commission favored the complainants, holding that the Texas & Pacific must not take Liverpool shipments from New Orleans to San Francisco for less than it charged on New York shipments. The argument that an advance on the Liverpool shipments would not help any one, because the San Francisco consignees would then get their goods via Panama, was not overruled. Judge Wallace, in 1892, and the Circuit Court of Appeals at New York in 1893, both sustained the Commission, but all three are now reversed. The Supreme Court says:

"The uncontroverted facts that appear in the record would seem to constitute 'circumstances and conditions' worthy of consideration. The view of the Commission seems to have been that it was not competent for the Commission to consider such facts—that it was shut up by the terms of the act of Congress, to consider only such 'circumstances and conditions' as pertained to the articles of traffic after they had reached and been delivered at a port of the United States or Canada. . . . It could not be supposed that Congress, in regulating commerce, would intend to forbid or destroy an existing branch of commerce of value to the common carriers and to the consumers within the United States. The Commission should take into consideration all the facts of the given case—among which are to be considered the welfare and advantage of the common carrier, and of the great body of the citizens of the United States who contribute the consumers and recipients of the merchandise carried. Viewed in this light the Commission's order is held unwarranted. The attention of the Commission is not to be confined to the advantage of shippers and merchants who deal at or near the ports of the United States in articles of domestic production. The Commission seems to have thought that it was a sort of co-ordinate branch of Congress, and that it was its duty to so construe the act to regulate commerce as to make it practically co-operate with what is assumed to be the policy of the tariff laws. The act does not disclose any purpose or intention on the part of Congress, to thereby reinforce the provisions of the tariff law. These laws differ wholly in their objects from the law to regulate commerce. Their main purpose is to collect revenues. . . . The effort of the Commission by a rigid general order, to deprive the inland consumers of the advantage of through rates, and to thus give an advantage to the traders and manufacturers of the large seaboard cities, seems to create the very mischief which it was one of the objects of the act to remedy."

Mr. Justice Harlan read a vigorous dissent from the judgment of the Court, and Chief Justice Fuller and Justice Brown also recorded their dissent.

### Signal Light Colors.

The report of the Chicago Signal Committee on the colors of lights, summarized in another column, is thoroughly conservative; and, assuming that "conservative" and "safe" always go together, it may be regarded as sound. But we are not sure but this subject is to a certain extent exceptional. It does require boldness to make a radical change, costing considerable money, when, as the committee says, experience seems to show that we are all right as we are. But what about the radical action of the English roads? Englishmen are supposed to be conservative, and even slow, and yet they have adopted green for all clear with remarkable unanimity, and the expense must have been a greater obstacle there than it would be here, for they have many more signals.

We have not heard that they ever had any sharper warning in the shape of collisions due to mistakes in finding lights, or to broken glasses, than we have had. It should not be forgotten that we actually have had warning disasters in this country. (See, for one, *Railroad Gazette* Oct. 11, 1895, page 674.) When a chorus of voices in the meeting of the Superintendents' Society said they never heard of such a case, the one member who had heard of cases—or rather who remembered them—jumped up much more promptly than any one expected.

It is not true that "experience *has shown* that trouble is not to be anticipated," as the committee says, though it might be fair to say that experience had *not shown* much of anything enlightening in this direction. But "experience" is of doubtful value in this matter. Generally the term means the experience of enginemen, as understood or *told* by superintendents; but enginemen do not always clearly explain their experiences, or the superintendents, at any rate, do not always get an exact idea of the opinions the runners actually hold. The multitude of times when a runner takes chances in looking at signals, or forgets to look at all, do not appear very prominently in the mental log-book that he lays before the superintendent.

Trouble *is* to be anticipated from the use of white lights for all clear, because outside confusing white lights are constantly becoming more numerous and because we are depending more and more each year on fixed signals. That is the argument for the future—the near future, we mean. For the present we have the well-known arguments which are familiar to the readers of the *Railroad Gazette*, and some of which are stated in the committee's report. The broad general argument, which reinforces all the rest, is that the use of green for all-clear would lead enginemen into the right habit of always looking for a safety signal, and would gradually do away with the dangerous habit they have of looking first or chiefly for a danger signal—of assuming that the absence of red means safety. This dangerous habit is now common. No one can prove exactly how common, but the fact, admitted by every one, that it is at least difficult in many cases to seasonably distinguish the white signal light from other white lights, affords presumptive evidence which we have no doubt is satisfactory to every superintendent who really weighs the matter.

The committee says that a white light would be unsuitable for a caution signal because, if white indicated caution, the breaking of a red glass (at a home signal) might some time give a caution indication when it ought to be "danger." We think this fear lacks a rational basis. In the first place no one, so far as we have heard, proposes to use white for caution, except at a distant signal. The use of three indications at a home signal, to be given by the movement of one arm, is unsatisfactory at best, and ought to be abolished. If permissive blocking is neccessary the permissive indication ought to be given by some means as different as possible from the ordinary clear and danger semaphore indications. A card or other tangible thing delivered to the engineman seems to us highly desirable, if not essential. With caution lights used only at distant signals, and adopting Mr. Grafton's excellent rule of allowing no other signal on the same post with a distant, the whole matter is at once greatly simplified. The home signal at night then conveys to the engineman no instruction at all, unless it shows either a red or a green light; a white light there conveys the same meaning as no light at all, or as a broken post. The white light is used only on a signal which may be so located that it never need be heeded until the train gets close to it; close enough to enable the engineman to positively distinguish it from all other lights.

Again, why not make all caution signal lamps double-face, like Mr. Carter's lamp, used in his green-and-red combination? With suitable reflectors each flame could be made to show two lights, thus making the signal different from street and house lights, at small expense. If this arrangement were recommended for all signals it might be objected that the lamps would cost too much, but the number of distant signals is so comparatively small that the expense could not be burdensome. The one well-settled fact about distant signal lamps is that we can readily get a safe signal, one that would be liked by enginemen and that would not be much more costly than those now used, whenever there shall be a determined effort to get one. Whatever obstacles there may be to the use of green for all-clear, the lack of a suitable distant signal cannot rightfully be classed as one of them.

Since writing the foregoing paragraphs we have received the account of the discussion of the Committee's report and have added a summary of it to our article. It is gratifying to see that the difference between the function of a technical expert and that of a cheese-paring purchasing agent was clearly brought out. Now, if these signal-making experts will compare notes with the signal-using experts, the division superintendents, we may hope for a thoroughly rational settlement of the question at issue. The point was brought out at the meeting that, as red was originally chosen for its present function because the most striking color was naturally desired for the signal which the engineman would be most vitally interested in quickly discerning, the same color ought now to be used for all-clear, since we have at length learned to follow the more rational principle of looking first for the clear-signal. This was mentioned by Mr. Wileman. His theory is good, so far; but red has been so long identified with "stop!" that inbred prejudice would probably thwart all efforts to effect so radical a change. On the other hand, the use of white (or amber) for the distant signal light, with a double-faced lamp would almost disarm prejudice at the outset, for the appearance of the signal would differ in a marked degree from that of any other fixed signal used in the present prevailing system.

### The Supreme Court Decision in the Brown Case.

The decision of the United States Supreme Court taking away from guilty witnesses the constitutional guaranty that they need not divulge their guilt, has been widely discussed. Perhaps the the most common remark is that we shall now see a practical cessation of secret rebates, as every rate cutter will entertain a wholesome fear that the other party to the crime, or some third person, will expose him

But other competent observers are not so sure. There are many ways of favoring a shipper which are so hard to connect with any particular shipment that now, as in the past, much actual discrimination can be kept up, with confidence that no specific law-breaking can be proved in court. The arrangements of railroads with steamship lines are a familiar example. How can the law dictate to the Chesapeake & Ohio in the matter of the dividends it shall receive

or decline to receive from the C. & O. Steamship line? How about a contract for the use of switching engines on a private siding? Or the payment to a large interstate shipper of heavy rebates on his intrastate shipments? What more perfect arrangement for discrimination than the ownership of coal mines by the Philadelphia & Reading, whereby the operators of other coal mines can be constantly worried by shifting the profit from the mine price to the transportation price and vice versa?

But it will have a powerfully soothing effect on public sentiment if the more open rate-cutting can be choked off. If the Chicago sensational reporters can only be drawn off upon some other scent, newspaper readers will get a "much-needed rest" which they have long wished for. There is some hope of this, as there is no doubt that the great bulk of the rate-cutting transactions (which have been talked about) have been pretty bold. Continued immunity year after year has led to practical defiance of the law. But the Brown decision will at once reverse the current of thought in hundreds of judges' and lawyers' minds all over the country and the rate-cutter's nonchalance will be correspondingly disturbed. This hopeful view is strengthened by the fact that only a few, even of the worst rate-cutters, are deliberate law breakers. Most of them have tried to cling to the belief that the law against secret rate-cutting was unjust; in that confidence they have managed to preserve some conscience, which now will be clarified and strengthened by the more effective working of the legal machinery designed to enforce the law.

As far as the great central portion of the country is concerned the Brown decision can almost be said to have been unnecessary, for the Joint Traffic Association has stopped irregular practices without it. Every day adds to the prestige of that association and vindicates the soundness of the simple theory that rate making is always easily controlled by the directors of a railroad, and that railroad managers agree with one another as readily as men in any other large business as soon as each one knows whom he is dealing with and where to find him. As far as the Joint Traffic Association is concerned the law-abiding traffic men have already got the upper hand and they have thus far repressed the reckless ones without the aid of the Interstate Commerce Commission or of the Courts. The one further thing needed to produce a normal condition (so far as the Government can do anything toward that end) is a law to permit pooling, so that the railroads will voluntarily abandon not only illegal discrimination but all other kinds. The spirit of the law contemplates entire equality, as between all shippers, but as long as discrimination is lawful in nearly every other business, and often is not opposed to true public policy, the only practicable way for the state to promote equal treatment in such a complex business as transportation is to give the utmost freedom to honorable railroad managers to work out their economic problems in their own way.

The opinion has been expressed that this decision of the Supreme Court, being by such a narrow majority, may not stand forever. It is impossible to say how much there is in this prediction. We print the essential portions of the dissenting opinions in another column. It will be seen that the practical working of the law may depend upon subtle technicalities which only the patience of hair-splitting lawyers can ever clear up sufficiently to enable ordinary people to form definite opinions one way or the other. Judge Shiras' view is based largely on the fact that it is impracticable to completely protect a person from being prosecuted; the pardoning law attempts an impossibility. Judge Field's opinion is not different in spirit. It takes the broader and firmer ground that the President's pardoning power is indefeasible, and that the language of the fifth amendment is so plain and simple as to be impregnable. Taken together they make out a strong case. No aggregation of the arguments of judges of lower courts in past years, many of them, in our opinion, tinged with sophistry, can outweigh the force of simple common sense and the plain Anglo-Saxon of the Constitution.

The discussion of this decision has naturally led to a renewed demand for action by Congress on the bills to make the railroad itself responsible for illegal acts, instead of the agent or employee, and to require that when cases are taken to a court for decision such decision must be based upon the same evidence as was given before the Commission. Whether the present Congress will dare to touch anything that may in any way affect commerce it is impossible to foretell, but these proposed laws have really encountered very little objection and ought to be passed. In making the corporation liable it is not necessary to repeal the existing provisions for punishing the person also. The requirement that a case shall be fully presented the first time it is tried is only a reasonable safeguard against wasteful delay.

## The Central Vermont Receivership.

On the 20th of March the Central Vermont Railroad was forced into the hands of receivers under circumstances which make the whole transaction seem a case of very hard luck. The moving force in this matter was the Grand Trunk Railroad, which has long been a considerable creditor and an important factor in the operation of the Vermont company and which last week brought the bill which resulted in the appointment of the present receivers. As one of these receivers is the General Manager of the Grand Trunk system rumors of course are current that the Central Vermont will be henceforward practically operated from the offices of the former road in Montreal. But, laying such rumors aside as unsafe ground for present conclusions, it is not difficult to discover the immediate cause of this sudden action on the part of the Grand Trunk managers.

For some time there has been a close traffic agreement between this road and Central Vermont, which has been valuable to the Canadian company in affording a very direct route for its heavy shipments from Chicago and the West to Boston. But with the growth of this business, the chief competitor of the Grand Trunk, the Canadian Pacific, has been working its way into closer connections with the Vermont road, and a switch line has been actually built between the tracks of these two roads, at a point near St. Johns, with a view to diverting part of the Boston traffic which the Grand Trunk had hitherto monopolized. It is just this danger which the managers of the Grand Trunk have prevented by forcing a receivership of the Vermont company and putting in their own chief official as receiver.

The original causes, however, of the present condition of affairs lie very much further back, and are the outcome of the peculiarly unfortunate history of this Vermont road and the immense burdens which were piled upon it. In 1855, five years after its creation, the Central Vermont and its leased line, the Vermont & Canada, were put in the hands of receivers, and remained there 28 years, until 1883. During all that time the property was the subject of fierce and costly litigation. Great sums were spent in the courts and almost equal amounts were thrown away by the receivers in the management of the property. The wreck of the property which was saved from the lawyers and receivers was at last pulled together in 1883 and reorganized by foreclosure of the general first mortgage, under the name of the Consolidated Railroad of Vermont. This company issued a consolidated five per cent. mortgage of $7,000,000. From 1883 till 1892 a long series of leases and consolidation of branch lines was carried on, the Central Vermont reappearing and leasing the consolidated company as well as a great number of smaller lines as feeders. All these leases brought considerable burdens as well as advantages to the Central Vermont, the heaviest of all being this consolidated company's mortgage indebtedness, which was the result of the long period of suffering and mismanagement from 1855 to 1883.

The Grand Trunk, according to the allegations in the bill for receivership, is a heavy creditor of the Vermont company, holding about $700,000 in bonds of the Consolidated Railroad and $1,000,000 of the 4s of the Central Vermont, and in addition to this claims an unpaid traffic balance of $415,712, which has run up since July, 1894, and $100,000 of the Central Vermont's floating debt. Further, the bill urges the immediate prospect that other large creditors of the road will press for payment of their claims, and that a dismemberment of the system is probable through attacks on the various leases, with the result that the company would be totally crippled and unable to pay the fixed charges on its main mortgages. How close these probabilities are is of course unknown to the outsider. This is at least probable, that the road can earn its fixed charges on the burdensome mass of securities which its unfortunate past has entailed upon it, but this earning power depends wholly on the integrity of the system and the retention of its most important leased lines. At any rate, the situation was grave enough to give the Grand Trunk the chance it wanted just now to bring about the receivership.

Some of the branches of least commercial value will probably be severed, and this thought raises an interesting question as to the future of the New London Northern, which the Central Vermont operates so far out of its own natural territory. There is a possibility that the Boston & Maine may get hold of this and other released members of the Vermont system; there is also a possibility that the New Haven company, with its present passion for absorption, may quietly gather in this road as almost the last few miles of track in Connecticut not yet in its control. These alternatives are suggestive of interesting result for the future, but it is now too early to do more than point them out as possibilities.

## Two Single-Track Railroads Not Before Heard of.

Two prominent railroads, each with a high reputation for safety, reputations based largely on their double tracks, have recently had bad collisions due to the practice of old-fashioned single track methods. On a road where every rod of the line is double track passengers expect perfect freedom from butting collisions, and similar immunity from facing point-switch disasters is confidently expected on a road which boasts of its complete interlocking; so that these accidents come as a surprise.

On the Pennsylvania, five miles east of Harrisburg, March 17, about 4 a. m., an eastbound stock train was ordered to leave track No. 3 and run some distance on the westbound passenger track, No. 2, in order to pass a slow freight train. The crossover was not at a tower, and the fireman had to set the switches. The train went on track No. 2 all right, but immediately after went through another crossover, the switch to it having been left misplaced some time before, and fouled track No. 1 immediately in front of a heavy passenger train running in the same direction. The passenger engineman and fireman were killed and 19 passengers were injured. The freight train must have been running very slowly but the misplaced switch was not lighted, being treated as a trailing point.

On the Manhattan elevated, at the well-known 110th street curve, New York City, at the northwest corner of Central Park, about 2 p. m. on March 21, an express train, running south on the middle track, met an empty engine coming north, and there was a regular butting collision, such as they have in the wild and woolly west, though the speed of both trains was under control to such an extent that no wheels jumped over the guard timbers. The engines and one passenger car were considerably smashed and the enginemen and one fireman were injured; the other fireman jumped off upon the platform with which the structure is provided at this point. On a surface road this collision would pass without unusual attention (in fact it might not have happened, as surface roads use the Westinghouse quick-acting brake, which stops a train in less distance than the vacuum, used on the Manhattan), but a higher standard of safety is demanded on the elevated, as a matter of course, and at this particular point the track is about 50 ft. above the ground. A little collision here alarms the patrons of the road more than a much worse one only 15 ft. in the air.

The officers of a good many poor, single-track roads will be likely to point the finger of scorn at these proud companies when they read the accounts of these accidents. Poor railroads often envy those which enjoy a heavy traffic, because the latter can have two or four tracks. But what becomes of the safety feature when one of the double tracks is used for trains running in both directions?

The fatal switch on the Pennsylvania enjoyed the reputation of being a trailing point, but this variation in practice made it a facing point. The rule that all facing points should have distant signals doubtless holds a high position, theoretically, on the Pennsylvania; but theory doesn't amount to much when the train despatcher is authorized to run trains wherever he pleases. The rule that facing points should be exceedingly few and far between, and should be thoroughly protected and constantly attended, is one of the best "safety devices" known in railroading; though there is not so much glamor about it as about some appliances which produce a better pictorial effect in advertisements.

The Elevated case carries practically the same general moral as the Pennsylvania's. The public had never suspected that the middle track was used in both directions at the same time. To run express trains upon it south all the forenoon and north all the afternoon would be about as safe as double-track working, and would conduce to economy by postponing the necessity for a fourth track. But the introduction of ordinary single track methods necessitates all of the elaborate safeguards of the standard code, as studied and developed on the single track roads of the west. It is true that the speed of the trains on the Manhattan is very moderate, and most of the line is straight, but—this was a very close shave, all the same.

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The success of the Managers of the Joint Traffic Association seems to make courage contagious, and irregular practices are being rooted out in places where laxity has long been the rule. A Chicago paper says that the transcontinental roads have received a lecture from the Chairman of the Transcontinental Passenger Association on looseness in collecting children's fares. He has found that in consequence of competition in business passenger agents have been in the habit of advising persons traveling with children ranging between the ages of 5 and 12 not to buy tickets for them, the probability being that conductors would never ask for them. Passengers have also been advised that for children from 12 to 15 or over half rates would be sufficient, as no questions would be asked about their age. From this looseness of practice the roads have lost much revenue, and the chairman now calls upon the heads of departments to issue positive instructions to passenger agents and conductors prohibiting entirely all such practices. It is remarkable, though not surprising, how that one loose bolt in the railroad machine, the ineffectual check on the passenger conductor's financial work, can constantly thwart

all attempts at accurate accounting. The practice here referred to begins, of course, on heavy accommodation trains where the conductor finds it impossible to get any fare from some passengers, and where the loss of a half fare for a short ride is of such small account that it seems insignificant in comparison with the strenuous fight that it is often necessary to make with the child's mother. The superintendent needs to keep a constant watch to see that the habit of skipping five-cent fares, voluntary in many cases, is not extended by the conductors to cases where the loss is 50 cents or a dollar or more. The transcontinental roads in former years were very strict with children. We never heard that a train due to start at 11 p. m. was held until after midnight so as to get beyond a boy's twelfth birthday, but it was rumored that passengers on the Union Pacific sometimes deemed it politic to take along the family bible, with its record, when making a journey, so as not to subject themselves to the mortification of having their word doubted. The practical importance of this question of age limits is probably greater than is indicated by the simple cash value of the fares involved, for the reason that every irregular practice tolerated tends to encourage looseness in other directions. The only hope of keeping passenger receipts anywhere near equal to the amount actually earned by the trains, as calculated by the tariff, is in maintaining the strictest possible discipline in all the details of the conductor's work.

## NEW PUBLICATIONS.

*A Treatise on Hydraulics.* By Prof. Henry T. Bovey, McGill University, Montreal. New York: John Wiley & Sons. 1895. Octavo, 338 pp. and index. Price, $4.

Professor Bovey's book is a useful addition to the literature of hydraulics; but we are not entirely convinced that it is one of those rare books that the world really needed. With so clear and complete a text book as that by Professor Merriman, it is questionable whether another one on the same subject is wanted now. There is an unfortunate tendency to multiply text books without sufficient reason, and the only justification for a new book for the class room is a clearer statement of theory or additions to the record of observed fact sand data. The former end has been attained by Professor Bovey in a more comprehensive statement of the mathematics of the subject. His use of Bernouilli's formula places everything on a rational basis from which the student may derive his theory of the flow of water without memorizing a great number of complicated equations.

The book is divided into seven chapters; the first being devoted to certain fundamental conceptions and to the flow of water through orifices and mouth pieces and over weirs. The units of measurement might better have been feet and decimals, than a mixture of feet and inches; but perhaps in the next text book on the subject the metric system will be used.

The second chapter contains a short treatment of fluid friction, while the three succeeding chapters contain a fairly full treatment of the flow of water in pipes and open channels and the measurement of flow.

The last two chapters on impact and hydraulic motors form the largest division of the book, and the comparison of different types of turbines is very good.

On the whole, the book is a very satisfactory treatment of the subject in short compass, and if it does not entirely meet the needs of the student who approaches the subject for the first time, or of the practicing engineer whose requirements are fuller data on practical work, it has, on the other hand, a perfect mine of problems for the use of the instructor in the class room. A number of small errors in the type should be corrected in a second edition.

*Compressed Air.*—We have received the first number of a little monthly publication called "Compressed Air." The office of publication is 26 Cortlandt street, New York. The subscription price is $1 a year, the price per number, 10 cents. The preliminary announcement of the editors is that the magazine is published for the purpose of disseminating information regarding the uses of compressed air. These uses are widening every day "and its possibilities are beyond conjecture" In this first issue we do not find anything to encourage the hope that the magazine is going to be a valuable addition to the ranks of technical journalism, but perhaps it will become more vigorous with age.

*Journal of the New England Water Works Association.* March, 1896. Walter H. Richards, Junior Editor, New London, Conn., 75 cents a number.

This journal is issued quarterly. The March issue contains the full report of the quarterly meeting of the Association with the papers and discussions. One paper is on the Water System of Burlington, Vt., by F. H. Crandall; another is on the Sanitary Condition, Past and Present, of the Water Supply of Burlington, Vt., by Prof. W. B. Sedgwick; and another is "An Electrical Pumping Plant," by Chas. A. Hague.

## TRADE CATALOGUES.

*Grub and Stump Machines*, and other appliances for clearing timber land. The Milne Manufacturing Co., Monmouth, Ill., 1895.

This company, by means of an 88-page catalogue, illustrates and points out the merits of its grub and stump machines for clearing timber land. These machines consist of a capstan arrangement, made of iron and wood, or all iron, and are operated by horse power, the plan of pulling stumps being to attach a wire cable to them, the other end of the cable being wound around the drum of the capstan. They are then hauled from the ground by the turning of the capstan. The catalogue contains many illustrations, testimonials and other advertising matter relating to this method of clearing off land.

## Railroad Legislation in Virginia.

The General Assembly of Virginia has during its recent session passed a number of railroad laws. One of the most sweeping measures is the act incorporating the Pacific Company. After passing both Houses Governor O'Farrell disapproved the measure as being of too general a character. The Senate, where the bill originated, promptly passed the bill over the veto of the Governor, but in the lower branch this same object was only achieved after a hard struggle during the closing hours of the session. The law names as corporators Harry Keene and Charles Coudert, of New York; D. S. Walton, of New Jersey; John C. Barron, E. J. Jerymanowski and Charles F. Dietrich, of New York; G. Clinton Gardner, of Pennsylvania; R. W. Hawkesworth, of New Jersey; Jose M. Yrigoyen, of Peru; Isaac Atzamora, of Peru; and others. Capital stock not less than $100,000, but it may be increased to one hundred million. Principal office in Virginia at Lexington. The powers of the company, defined in sections four and five, include the right to build or lease railroads anywhere in South America; to run steamboats anywhere, to establish banks, docks, canals almost anywhere; "and it may acquire, build, own and use wharves, piers and warehouses at or near Norfolk and Newport News, Va." It may also mine coal or any ores, guano, nitrates or other minerals, and manufacture or develop any metals, oil, asphalt, etc., in any part of North America which drains into the Pacific Ocean; may lay out a town or towns, and may divide the same into lots or squares, etc., and may virtually run the town.

On Jan. 15 the Governor of Virginia approved the act authorizing the purchasers of the Norfolk & Western, sold by foreclosure, to become and be a corporation, to adopt a name, etc.

On Jan. 23, an act was approved granting the New York, Philadelphia & Norfolk entry to the city of Portsmouth under certain conditions. On Jan. 27 a law was enacted confirming the charter of the Norfolk wharf, warehouse and terminal company, conferring upon it the rights and obligations of a transportation company, and changing its name to the Norfolk Terminal & Transportation Company. This act gives the Chesapeake & Ohio terminal facilities in Norfolk, thereby bringing it into closer competition with the Norfolk & Western.

On Feb. 11 the Governor approved an act to permit any railroad or transportation company to acquire certain real estate not exceeding any limitation previously prescribed by the Commissioner of Railroads, to whom notice shall be given of any proceeding to acquire lands. On the same day a law was approved which grants the Chesapeake & Ohio the right to construct the necessary steel viaducts on its main line as well as the James River division, to make the contemplated improvements involving the construction of new passenger and freight depots in the city of Richmond. On Feb. 29 a law was approved, authorizing the management of the Winchester & Potomac to borrow a sufficient sum of money to secure the amount of $147,250 first mortgage bonds, held by the Baltimore & Ohio, at the time of their falling due, on July 1, 1897.

Among other laws enacted which to some extent affect railroads, were those rendering more effective the liens of mechanics, laborers, etc. One of the statutes referred to is broadened by the introduction of the word "laborer," who is specifically given the same lien as general and subcontractors. The lien under these sections is also made to apply to railroads as well as to buildings. The time within which the lien must be claimed is extended from 30 to 60 days. Employees and persons furnishing supplies to railroads, canals and transportation companies are entitled to a lien within 90 days.

## Annual Report on Canadian Railroads.

Hon. John Haggart, Minister of Railways & Canals for the Dominion of Canada, has issued the annual report of his department for the year ending June 30, 1895, and it may be had of the Government printer, at Ottawa, for 45 cents. The volume, which contains about 600 pages, is largely filled with detailed statistics of the traffic on the canals and the Government expenditures on canals and railroads. There are a dozen good maps, showing various sections of the Dominion, on large scales. The principal totals in the railroad statistics are as follows:

| | |
|---|---|
| Length of railroad completed, miles | 16,091 |
| Length of railroad under construction, miles | 225 |
| Number of engines | 2,023 |
| Sleeping cars (owned) | 73 |
| Sleeping cars (hired) | 114 |
| Parlor cars | 42 |
| Passenger cars, first-class | 1,076 |
| " second and third classes | 702 |
| Baggage cars | 1, 54 |
| Box and stock cars | 36,360 |
| Platform cars | 1,758 |
| Hopper and dump cars | 4,815 |
| Passenger train mileage | 15,332,276 |
| Freight train mileage | 19,339.699 |
| Mixed train mileage | 5,389,915 |
| Total train mileage | 40,061,890 |
| Earnings from passengers | $13,311,440 |
| Earnings from freight | 29,545,490 |
| Total earnings, including miscellaneous | 46,785,487 |
| Operating expenses | 32,749,669 |
| Net earnings | 14,035 817 |
| Number of persons killed | 187 |
| Number of persons injured | 658 |

The total amount of aid granted to railroads, to June 30, 1895, was $203,434,761, of which $187,082,759 was granted by governments and the balance by municipalities. About two millions of the municipal aid was in the shape of subscriptions to stock or bonds.

## Two Oil Filters.

There have recently been put in the market two oil filters, which are shown in the cuts. They are of somewhat novel design and are built different from each other in principle. Fig. 1 shows the Q & C Perfection oil purifier. In this the oil is purified by passing through a body of water. Water is first poured in at the top until it reaches the required height shown by the lower gage glass, and it is heated to the required temperature, 115 to 120 deg. Fahr., by steam circulating through the pipes shown in the figure. Oil is then poured in slowly until it rises to the top of the upper gage glass. The purified oil is drawn off by the upper faucet. The apparatus is cleaned by drawing off the oil, taking out the interior and making steam connection with the lower steam pipe. The steam is then turned on and the dirty oil is forced out through the lower faucet. Cleaning will be required once every 6 to 12 months.

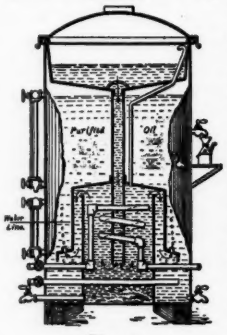

Fig. 1.

The Aurora oil filter is shown in Fig. 2. In this the oil is filtered through screens, instead of water. The oil is poured in the upper part and passes through the upper screen down the cylinder into the receptacle below, where all impurities remain. The oil then passes upward through the lower screen in which is a filtermass, and is there more thoroughly filtered. The gage shows the height of the purified oil which is drawn off by the upper faucet. The filtermass requires renewing after a year or two years' use, when it can be taken out through the hand hole.

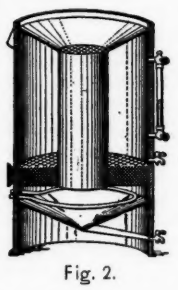
Fig. 2.

The "Perfection" filter is made by the Q & C Company, Western Union Building, Chicago. The "Aurora" is made by Mr. Henry C. Ayer, Betz Building, Philadelphia.

## The Congo Railroad.

Between the tidal region and the upper stretches of deep water in the Congo there is a stretch of rapids and waterfalls 250 miles long. This distance had formerly to be crossed by caravans, and it took 20 days to make this part of the journey. The following information of the railroad building there is taken from a paper read by Dr. P. Briant, at Antwerp, and abstracted in *Revue Universelle des Mines:*

It had been intended to build the road on the right bank of the Congo, but this territory was awarded to France, while the Congo State retained the left bank, and, consequently, the line was surveyed on the latter side. Matadi, some 70 miles inland on the Congo and 85 ft. above mean tide, was chosen as the terminus, the river at that point being of sufficient depth to admit the large steamers. The road extends from there to the Palaballa Pass, 919 ft. above the sea. The distance between the two places is only 6¼ miles in a direct line but is considerably longer by the railroad.

Above the pass and 14 miles from Matadi the road is 578 ft. above the sea, it rises again to 764 ft. in the Horizon Pass, falls to 627 at Inpurigu and rises to 853 ft. at Keuge-Lemba. The road was finished to this place, 35 miles by rail from Matadi, in 1893, and since then one train has been running daily each way between the two places. At the present time the road has been built about 32 miles beyond this point.

Difficulties of various kinds were encountered from Matadi to Palaballa Pass. The line which extends along nearly vertical quartzite bluffs and piles of loose boulders, required a great deal of blasting, and numerous retaining walls, and bridges had to be built. The Inposo River was crossed at a point 226 ft. above sea level, two and a half miles above Matadi, the distance by railroad being six and a quarter miles. Bridges had even to be built over depressions in the rocks, for after the heavy thunderstorms these would become raging torrents filled with good-sized rapid streams. At Inposo a trestle was washed out and several men lost by a flood which came almost without warning. Afterwards a bridge of 200 ft. span was put at that place.

The heat reflected by the rocks was intense, making the death rate so high that much trouble was experienced in getting men to work. Chinese, Hindoos and Zulus were imported, but only the latter could stand the strain. After the highlands were reached, however, there was no trouble to get men, even the natives being willing to work. Those from Lagos made good earth-workers, those from Acra iron and wood workers, while some of the Hindoos made good riveters.

Above the passes the road enters a section of rolling country in which are farms and villages, and the construction of the road is easily done. The cost of the first five miles was about $1,200,000, or $240,000 per mile, while the next 21.5 miles cost only $35,000 per mile, and now an average of 2.5 miles a month are built, at $20,000 per mile. It is expected that the entire road will not cost over $13,000,000.

Receipts are figured as follows: About 110,000 carrier loads of European merchandise reach the Stanley-Pool annually over the several caravan routes, and 30,000 loads of ivory and india rubber are taken back. Each load weighs 66 lbs. and costs from $10 to $12 to carry. The cost of transportation is, therefore, at present about $1,400,000 per annum. The railroad is going to charge on imports 20c. per ton per mile, and on exports 15c. per ton-mile plus 10 per cent. of the value.

By this tariff it is expected other products than ivory and gums, as honey, fine oils and hard woods will become exportable, not counting the hopes based on new coffee and tobacco plantations. The above-mentioned 140,000 carrier-loads alone will yield a revenue of 3.75 per cent. on the cost of construction.

## Shop Notes—Chesapeake & Ohio.

The shops of the Chesapeake & Ohio Railroad at Richmond, Va., have recently received an important addition. in a new paint shop. It is a model of convenience and good designing. The walls are of brick, the roof is carried by iron trusses, the windows occupy the greater portion of the sides and ends and the interior is white, so that the light is bright and soft. Of course such a building is well heated, and the ample piping enables the temperature to be raised to ninety in case there is a rush job on hand and it is desirable that a coat of varnish should be dried between the evening and the morning.

The shop has a length of 164 ft. and a width of 65 ft., with three tracks, giving ample room for six of the largest cars owned by the company. The whole floor is laid with granolithic pavement, with slopes draining to the center of the space between the tracks, and the drainage takes care of itself and there is no dampness to injure varnish by sweating, as we find where wooden floors are saturated with the water that must, at times, be so freely used about a paint shop.

It is customary to consume about fifteen days in painting a car, though with the facilities for rapid drying it is possible to cut the time down to twelve; but this is not recommended where the best work is to be done. The Chesapeake & Ohio is one of the few roads that still adhere to a light color for its passenger coaches. Cadmian yellow is used, which is very satisfactory when regarded from the standpoint of durability, but is more expensive than either Tuscan red or the Pullman color. Neither do the varnishes last quite as long, for the color shows the dirt and the varnishes are destroyed more rapidly than on ordinary cars by washings to which they are subjected. One reason for this rather expensive color lies in the use of the car as a constant advertisement of the line. For example, on such a busy road as the Pennsylvania, an occasional train of Chesapeake & Ohio cars, if of standard Pennsylvania color, would attract no attention; but this orange color catches the eye at once, and whether the cars are running or standing in the yards at Jersey City, Philadelphia or Washington, they are seen of men and all have a knowledge of the F. F. V. trains thrust upon them whether or no, and the fast trains between New York and Cincinnati duly advertise themselves.

In the matter of car lighting these Fast Flying Virginians are among the few that use electricity. A large percentage of the cars of the road are so lighted. The storage battery is used for the purpose and charging stations are located at Covington, Ky., and at Richmond. We have described the system carefully in former issues. About 75 per cent. of the through and first class local cars are equipped, and while it is acknowledged that the expense of the light is probably slightly higher than it would be for gas or oil, the reason for its continued use is the superiority of the light. It is used to add to the popularity of the line and serves as another attraction to induce the public to travel by the C. & O.

These are the two features of the Richmond shops that are the most salient and which naturally attract the first attention, but the place is not devoid of other interesting matters. There is a laundry in which the washing is done for all of the officers' cars, the offices, and the Railway Branch of the Young Men's Christain Association that is connected with the road. This laundry has a well ventilated drying room into which the sunlight streams, thus rendering the use of bleaches superfluous and insuring whiteness of the linen.

In the machine shops we find a transfer table, recently installed, made of 24-in. I-beams carried on six pairs of wheels and axles. These run on three lines of standard gage tracks and are fitted with the standard axle boxes of the road. At present the car is moved by hand, but it is the intention to put an electric motor on it and use a trolley and wire for the connections.

Within the shops we find an extensive and extending application of compressed air which is supplied by a Pedrick & Ayer compressor worked automaticaliy and delivering into a reservoir at a pressure of 85 lbs. per square inch. The compressor is now worked up to its full capacity and a larger one will soon be put in position so that a greater supply may be made available. Among the hoists in use is one over one of the erecting pits where there is a traveler so arranged that all of the heavier parts can be stripped from an engine without requiring that any heavy lifting be done and this system will be extended to the other pits as rapidly as possible Air hoists are also in use at the lathes and wheel borers where heavy work is to be done, and there is a press for putting brasses into place.

In the boring of car wheels, the self-hardening Sandere son steel has been successfully introduced. Formerly the rate for a single borer ranged from 20 to 24 per day, while now it is about 50.

In many shops some elaborate arrangements have been made to use an air apparatus for pressing air-brake hose on the attachments, but a simpler method is in use here. The ends are merely soaked in warm water for a few minutes and are then easily slipped over the fittings by hand. It probably takes less time to do it in this way than it does with any air press, besides being less likely to disturb the material of the hose. It should be added that a coating of oil is first put on the fitting in order to enable the hose to slip over it more easily. Though oil is very detrimental to rubber, an examination of a number of pieces of hose showe l no deterioration at the fitting where the oil had been applied, probably because so thin a film was left when the hose was in position that it had no appreciable effect. It may be remarked that this method of soaking the hose is equally efficacious in loosening it for removal, as in softening it for the original application, when it is desired to save a piece without cutting at the ends. Of course this rarely happens but it does at times.

Apropos of the discussion before the Western Railroad Club on air-brake hose, an examination of a quantity of hose in the Chesapeake & Ohio shops showed that a goodly percentage of it failed by bursting at the kink that was caused by hanging it in the dummy coupling, tending to show that there is a good reason for not using the dummy coupling when the matter is regarded solely from the standpoint of the preservation of the hose.

Attention was called to a phenomenon in connection with the steam chest packing, which we have never noticed before. It is the grooving of the metal of the cylinder beneath the copper gasket on the inside. Elsewhere, that is at the front and back and outside, there is not a mark, and the metal is as smooth as when it was first planed, but on the inside, just over the steam passages, the metal is grooved out to nearly or quite the half diameter of the gasket. What causes it?

There is an old labor-saving scheme in use in the boiler shop that is deserving of mention, if only to attract the attention of those who are not practicing it. When the sheets on the coal space side of the tank are to be renewed, it is often found that the angles at the bottom are so badly corroded as to make it very difficult if not absolutely impossible to calk the new sheets and have them tight. All trouble and calking can be avoided by laying a thin strip of tarred paper between the face of the angle and the sheet. When the rivets are driven the paper is pressed into all of the inequalities of the metal and a tight joint is secured without any calking. It is not necessary or even desirable to use the full thickness of tarred paper, but it should be split. This can readily be done by warming it slightly. The question is naturally suggested, why, if this method is so efficacious in the case of repairs it should not be equally applicable to new work. But perhaps we are not quite up to the point of adopting so radical an innovation.

## The Electric Locomotives in the Baltimore Tunnel.*

The smallness of the leakage in this overhead construction has exceeded all expectations, especially as the tunnel is exceedingly damp, moisture constantly condensing upon the structure, and there being a constant drip upon certain portions of the work, through the brick arch of the tunnel. The working voltage on the line is about 650 volts.

The following is the service given by the motor for the month of December, 1895:

| | | | |
|---|---|---|---|
| Total No. of days.... | 31 | Average amperes per train ..... | 985.1 |
| Total No. of trains.. | 365 | Average amperes per car..... ... ..... | 41 |
| Total No. of cars....8,755 | | Average voltage..... | 675 |
| Average time per train..... | 10 min. | Av rage H. P. per train ..... .. ..... | 891 |
| Average No. of cars per train..... | 24 | K. W. hours.....10,446.1 | |
| Average No. of trains per day..... | 12 | | |

Perhaps you would like to know something of how we found the measure of what the locomotives could pull. We knew they would pull considerably, for we found by turning on the "juice" too suddenly we would generally jerk out a drawhead or break some coupling pins or links. For a short while after we had started the regular service, we had considerable trouble in this respect. We electrical people attributed it, of course, to the poor quality of the drawbars, etc.; but after awhile we learned how to apply the power, and how to start a long freight train. We find there is quite a knack in starting a train, as a great many of you gentlemen can testify, no doubt. But I can say we have now mastered it, and the locomotive operators have now no trouble whatever in bringing a train up to speed from a standstill. In fact, these operators, who were old steam enginemen, say they can accelerate a train without jerks better with the electric locomotive.

The starts are made on a down grade of six-tenths of one per cent., leading to the south portal of the tunnel; after the tunnel is reached the train commences to ascend an up grade of eight-tenths of one per cent., which continues through the tunnel. We obtained the Pennsylvania Railroad dynamometer car to measure our pulling capacity. The most the car would record was 26,000 lbs. drawbar pull. As the electric locomotive we knew would pull considerably more than this, we were obliged to select a light train. The results obtained in the first trip were, first, the total drawbar pull for a certain weight of train from which we calculated directly the drawbar pull per ton of train on the eight-tenths of one per cent. grade. This we found to be 22+ lbs. After subtracting the grade pull, which for an eight-tenths of one per cent. grade is 16 lbs per ton, we have the difference 6 – lbs. as the train resistance per ton. This, you will note, confirms the D. K. Clark's and other authorities' figures for freight train resistance. The drawbar pull per ampere we found was 28.6 lbs. [Particulars of these tests appeared in the *Railroad Gazette*, March 6.]

The operators of the locomotives are old B & O. enginemen, and they have become quite expert in the handling of these machines. It was thought at first that it might be necessary to have an electrician on the locomotive continually; but it is very gratifying to state that the operators are their own electricians, and they are able to handle the locomotive in every way as regards its operation. They are becoming more familiar daily with its simple mechanism, and are fully able to keep the machine in first-class condition themselves.

The current indicator or ammeter referred to is a very good thing for them in the operation, as, by it, they can see exactly the character of the train and of the track, and are able to instantly note the increase of pull as they open the throttle; and, consequently, they are not so liable to slip their wheels as on a steam locomotive.

We decided to measure the acceleration; that is, how fast could we bring a train of 900 or 1,200 tons up to a speed of twelve or fifteen miles an hour. We decided that if we could record the distance traveled in each interval of two seconds, commencing from the start and then lay these distances out as ordinates, we would get a curve showing the acceleration of the train. From the observations made we found that we could accelerate a 985-ton train up to a speed of 16 ft a second, or about 12 miles an hour, in a period of one minute. I doubt if a steam locomotive of equal weight could equal this performance.

We have exerted over 60,000 lbs. drawbar pull even on the track in the tunnel, which at times is very damp and greasy. We have made a speed running light of 61 miles an hour on an up grade. On a level this would mean 70 or 80. With a 300 or 400-ton passenger train we are able to make 40 to 45 miles. As our locomotive weights 194,000 lbs., you see we are getting a drawbar pull of about one-third of our total weight, which is the adhesive weight.

* A few notes from a paper by Dr. Louis A. Duncan read at the February meeting of the New England Railroad Club.

## TECHNICAL.

### Manufacturing and Business.

The Schoen Pressed Steel Co., capitalized at $1,000,000 has purchased the plant of the Schoen Manufacturing Co., for the manufacture of truck frames, and in addition has purchased five acres of ground adjoining the present plant in Allegheny, Pa. The site has railroad connections with the Pittsburgh, Fort Wayne & Chicago and the Baltimore & Ohio and a river frontage The present output of Schoen pressed steel specialties is from 50 to 75 tons a day, a tonnage which it is expected to double by the manufacture of the truck frame. The plant now has a capacity of 125 truck frames a day, but with improvements to be made this will be increased to 300 a day. In addition to the pressed steel truck frame invented by Mr. Charles T. Schoen, and illustrated in the *Railroad Gazette* a few weeks ago, the company will manufacture the pressed steel specialties heretofore made by the Schoen Manufacturing Co. It is said that New York, Philadelphia, Pittsburgh and Chicago interests are represented in the new Company.

Particulars were published last week of the completion of the organization of the Fox Pressed Steel Co., rumors of which have been current for some time. According to the *Iron Age* a company has been formed of New York and Pittsburgh capitalists which will build works at Pittsburgh to manufacture the Fox truck and other railroad material. The contract for the buildings and machinery has been let to Mackintosh, Hemphill & Co., of Pittsburgh. Five acres of ground have been bought on the line of the Allegheny Valley Railway near Fifty-second street. It is expected that the new company will be turning out trucks about the first of next October. The main building is to be 112 ft. wide by 450 ft. long, and its equipment will include 6 power shears, 8 hydraulic presses, 2 bending machines, 11 hydraulic punches, 7 power punches, 24 hydraulic riveting machines, 16 hydraulic cranes, 5 electric cranes and other smaller tools. Another building, 350 ft. × 62 ft., will contain a machine shop, blacksmith shop, boiler house, etc. It is proposed to use producer gas as fuel. The full capacity of the works will be from 300 to 400 trucks a day, employing from 1,000 to 1,500 men. According to the published information the new company will make all forms of pressed steel that go into railroad equipment. From all of this we may conclude that the pressed steel business is likely to be animat d in the next year or two.

The Pittsburgh Forge & Iron Co., of Wood's Run, Allegheny, is considering building a steel plant to be run in connection with its present establishment, which is principally used for manufacturing railroad supplies. About 1,000 men are now employed.

The manufacturers of the Leach sanding apparatus for locomotives announce that they now have a working model, similar to those heretofore furnished air-brake instruction cars for educational purposes, which has been designed expressly to meet the demand from engineers' and firemen's clubs and lodges. These will not be given away, but will be sold at a nominal price, found necessary for the protection of the makers. Particulars can be obtained from Henry L. Leach, North Cambridge, Mass.

The Michigan-Peninsular Car Co., of Detroit, has placed a contract with the Berlin Iron Bridge Co., for a new foundry building 160 ft square, one story high, to be of steel framework throughout. It is so designed that the lower chords of the trusses support runways extending the whole length of the building. These

runways carry trolleys having a capacity of 2,000 lbs., by means of which the molten metal is conveyed from the cupolas to any part of the casting floor.

Watson & Stillman, of New York, have for some little time been at work upon a lot of hydraulic machinery for the new American Pulley Works of Philadelphia, which is to manufacture a new all sheet steel pulley, in which the hub, spokes and rims are all made of thin sheet steel.

The Detroit Graphite Manufacturing Co. has caused a series of service tests to be made of its graphite paint for wear and for resistance to severe climate. The first reply is from Captain Hornbroock, of the steamer Moran, as follows: "It stands wear and weather better than anything I have ever used on my decks."

A company will shortly be formed in Harrisburg, Pa., to manufacture a car seat invented by J. Porter Harris, of that city.

The Standard Railway Signal Company has filed articles of incorporation in New Jersey. Headquarters will be at Rahway, and the company's capital is placed at $300,000. The company will manufacture interlocking apparatus and signals of all kinds for railroads. The corporators are Hilda M. Johnson, John M. Randolph and William B. Wells, all of Rahway, N. J. The President of the company is Mr. Henry Johnson, late General Manager of the Johnson Railroad Signal Co , and the Vice-president is Mr. John T. Cade, for many years with the Union Switch and Signal Co. Both these gentlemen have in past years taken out a number of patents in the signaling field, and the new company will also have the exclusive use of the patents of Arthur H. Johnson. Mr. Henry Johnson has been intimately connected with railroad signaling from its infancy. He was for many years with Stevens & Sons, of London, then with Saxby & Farmer, with both of which firms he held important positions. He was for some time Superintendent of Signals on the Lancashire & Yorkshire. Mr. Cade has been Eastern Superintendent for the Union Switch and Signal Company for many years.

The plant of the Norristown Tin Plate Co., at Norristown, Pa., has begun work again after an idleness of about 18 months. The works possess eight tinning stacks, which will be devoted exclusively to the production of a high grade of New Method roofing plate, manufactured by a special process.

Edward J. Gardner and L. R. Breeneman have been appointed receivers of the Carlisle Manufactnring Co., of Carlisle, Pa. Previous to the appointment of receivers a judgment for over $74,000 had been secured by a local bank. Some of the departments of the plant were closed last week, but others are still running. It is said that a readjustment of the company's finances will be made within a short time.

The McIntosh pneumatic blow-off cocks, manufactured by the Jerome Metallic Packing Co., of Chicago, Ill., are in use now on about 40 railroads. Among others the Pennsylvania lines west of Pittsburgh are using them.

The Drake & Wiers Co., Cleveland, O., report large sales of car roofs, their business for the month of February being five times as large as that of February, 1895. Over 45,000 of these car roofs are now in use.

At the annual meeting of the O'Neil Crossing Alarm Co., held at its Chicago office, 632 The Rookery, March 23, the following directors were elected: W. D. Drake and W. P. Johnson, of Cleveland, O.; J. T. Gardner, of Chicago; A. L. Dunbar and S. P. Austin, of Meadville, Pa. The company has recently made important improvements in its crossing alarm signal, and is doing a very large business.

The Pratt & Whitney Company, of Hartford, Conn., has declared a dividend of one per cent. on the preferred stock, payable April 15.

The Bucyrus Steam Shovel & Dredge Company, of South Milwaukee, Wis., has recently been selling a large number of its improved heavy steam shovels to the ore companies in the Lake Superior country. Among those which have recently purchased shovels from this company are the Pittsburgh & Lake Angeline Iron Co.; the Cambria & Lilly Mining Co., of Negaunee; The Penn Iron Mining Co., of Vulcan, and the Newport Mining Co., of Ironwood. The Minnesota Iron Company have also contracted for two large shovels to be delivered in May and June, and the Mahoning Ore Co. have bought a duplicate of the 60-ton shovel which they purchased last season, and which made a remarkable record in the heavy hematite which they mine. The last named shovels will be used not merely to handle, but to mine the ore. There have also been recent sales to the Wisconsin Central, the Chicago, St. Paul, Minneapolis & Omaha, and to Winston Bros., contractors on the Northwestern.

The Berlin Iron Bridge Co. writes: "We enclose to you herewith print from a cut which we have just had made showing how our corrugated-iron, fire proof shutters prevented a very disastrous fire at the Russell & Erwin Manufacturing Works, at New Britain, Conn., from spreading and destroying their entire plant. The interior of one building was completely burned out. Between this and the next there is but a narrow driveway. This building is a very extensive part of their plant, and if the fire had communicated to this the loss would have been most severe; it was, however, saved from destruction by our corrugated-iron shutters."

### Iron and Steel.

A report is now going the rounds of the press to the effect that a leading iron firm of England has ordered a large quantity of pig iron from an Alabama firm. James M. Swank, General Manager of the American Iron & Steel Association, is reported to have said in an interview that the order has probably been placed with a certain southern company. This company, according to Mr. Swank, exported 250 tons of pig to England in 1895, and sent 27,125 tons to Pennsylvania as well as large amounts to other states.

Since 1873 the average price per ton of British pig iron has fallen, in the case of Cleveland pig from £5 15s. to £1 15s. and 10d., and in the case of West Coast Bessemer pig from £8 9s. 3d. to £2 5s. 6d.

The Pennsylvania Steel Refining Co., of Philadelphia, is removing its works from 50 North Twenty-third street to South Greensburg. The company makes high grade tool steel.

The Corns Iron & Steel Co., of Massillon, O., was incorporated recently as successor to Joseph Corns & Son. The company makes common and refined bar iron.

The United Traction Co., of Reading, Pa., has awarded the contract for 1,000 tons of heavy rails to the North Branch Steel Co., of Danville.

The total value of exports into the United States of iron and steel, both free and dutiable, excluding iron ore, during January, 1896, amounted to $2,323,804, against $2 322,160 in the corresponding month of 1895.—*Bulletin* of the Iron & Steel Association.

At a meeting of iron and steel producers held in New York it was decided to regulate the production of steel to actual requirements by methods similar to those used by the rail manufacturers. It is stated that at the start the price of billets will be fixed at $20 a ton. Another meeting will be held soon in Pittsburgh to arrange details.

The directors of the Tennessee Coal, Iron & Railroad Co. met in New York, on March 25, and organized by a re-election of the present officers. James T. Woodward, W. S. Gurnee and James Swann were appointed a committee of three to look after the building of a steel plant at Birmingham.

Shipments of heavy forgings for a rifled cannon have been made to the Washington Navy Yard from the Bethlehem Iron Co.

### New Stations and Shops.

It is stated that the plans of the Chesapeake & Ohio for a new passenger station in Richmond, Va., which have been frequently referred to, are now so well advanced that work can begin as soon as certain questions between the company and the city government of Richmond have been settled. The plans of the company, it will be remembered, include the construction of a large station, an elevated road to reach the building, and other new terminal facilities, the estimated cost of all being about $2,000,000.

The Dunkirk Locomotive & Car Repairing Co. has been organized to hold the title-to the buildings at Dunkirk, Ind., which have been built by the New York Equipment Co., of 80 Broadway, New York, and are now about completed. The new company has a capital stock of $200,000 equally divided between preferred and common shares. The directors of the new company are James Irvine and George B. F. Cooper, President and Secretary respectively of the New York Equipment Co., and Charles A. Ball, also of New York City.

The Boston & Maine is to erect a large freight house at Mystic wharf near Chelsea bridge, Boston. It will be 170 ft. wide, 800 ft. long and 25 ft. in height.

The Seaboard Air Line, which two years ago removed all its wood working shops from Raleigh, N. C., to Portsmouth, Va., will establish woodworking department again at the Raleigh machine shops, where cars will hereafter be built and repaired for the Raleigh & Augusta and Raleigh & Gaston divisions of the system.

The contract for building the new machine shops of the Southern Railway, at Salisbury, N. C., has been let to Pettijohn & Co., of Lynchburg, Va., for $75,000; the roofing will be done by Thomas B. Dornin & Co , of the same place, for $15,000. The entire plant and equipment, it is now estimated, will cost over $200,000.

Messrs. D. H. Burnham & Co., of the Rookery Building, Chicago, will receive bids until April 14 for the new Union station at Columbus, O., which is to be built by the Cleveland, Cincinnati, Chicago & St. Louis and the other roads entering that city. In addition to the station proper bids will be received for building stores fronting upon High street and in the near vicinity of the station.

### New Iron and Steel Works for Japan.

Two important projects are, it is said, now being developed in Japan for the purpose of enabling the Japanese to produce all or nearly all of their iron and steel. The first is the reported plan for the establishment of a steel foundry by the English firm of Sir W. G. Armstrong & Co., Limited, and the terms are that 20 per cent. of the workmen shall be English, that the material shall for the present be brought from England, and that when a new arm is invented in England it shall be manufactured at the works in Japan. The Japanese Government gives the company a fixed subsidy for a certain term, at the expiration of which it will purchase the works outright.

The second project is for the construction of a large Bessemer steel plant capable of producing from 40,000 to 60,000 tons of rails a year.

### Testing Armor Plate for Russia.

A lot of 350 tons of American armor, made by the Carnegie Steel Co. for Russia, was tested March 24 at the Indian Head Proving Grounds, the tests being conducted by United States officers at the request of the Russian Government. The plate is for use on the first-class cruiser Russia, and is 5 in. thick. A ballistic plate was tested, being subjected to five 4-in. shells and one 5-in. shell. The contract requirements demanded only four shots; five did no damage to the plate. The sixth shot was the only one which did any material injury. The contract which the Carnegie Company now holds for the Russian Government consists of 1,100 tons, of which the 350 tons just tested is a part. In addition to this 5-in. armor, the contract includes 350 tons of 10-in. armor and 400 tons of 14-in. armor.

### Steel Wool.

The interesting product "steel wool" is intended for use in all cases where sandpaper, emery paper, pumice stone and materials of a kindred nature are employed. In bulk it resembles both in appearance and to the touch the hair commonly used for stuffing mattresses and chairs. The ordinary by-product known as steel shavings has for many years been used for rough work, in which the coarser grades of sandpaper are used; but the objections to the use of these shavings for the finer work of rubbing down varnish or paint on woods and for polishing metals were the harshness of and the lack of uniformity in the threads, and the edges of the shavings being very sharp, thereby cutting, instead of polishing, and being of many different sizes and shapes, would leave an uneven surface. The idea of making a machine to overcome these difficulties originated years ago in Switzerland with an observing German, who noticed painters gathering the refuse derived from the manufacture of reed for looms and picking therefrom the finer grades for use in rubbing down wood and metal work generally. Upon examination he found that this residue consisted of flat ribbons of steel, the borders of which were planed off, and before being assorted was an admixture of fine and coarse grades. He readily discovered two defects in the material thus obtained; first, it was impossible to obtain any appreciable quantity of a uniform grade, and, secondly, the temper and quality of the steel was such that only indifferent results could be obtained from its use. Eventually he built a machine for the manufacture of shredded steel or steel threads uniformly fine in quality but still retaining sufficient cutting propensities, and so delicate in texture, that instead of steel shavings he called it steel wool. Then by carefully studying the temper and quality of steel best adapted to his needs, he was enabled to perfect the product. The advantages claimed for steel wool are that it cuts more quickly and uniformly than sandpaper, does not clog or gum, and, being both flexible and perfectly homogeneous, adapts itself readily to the shapes of carvings and mouldings. The process is patented in Germany only by August Buhne & Co., whose sole agent of the product for the United States, Canada, Mexico and Japan is Aquila Rich & Co., 70 Maiden Lane, New York.

Steel wool is used for car and locomotive work by the Pennsylvania, Southern, Fitchburg, Concord & Montreal, Buffalo, Rochester & Pittsburg and other railroads and the Wagner Palace Car Co. Many imitations have been placed on the market which have the faults of the finer grades of common steel shavings mentioned in the first part of this article.

### An Accident to a Cast-Iron Arch.

Last February a peculiar and serious accident happened to a cast-iron bridge at Rochester, England. The bridge has three arched spans, the central 170 ft. and the side spans each 140 ft. In each case the rise is one-tenth of the span. Each arch consists of eight cast-iron ribs built up of six segments each in the central span, and five each in the side spans. The segments are planed at the joints and are coupled up with 2¼-in. bolts. Between the ribs are cast-iron frames placed radially, serving as distance pieces. There is no complete system of bracing. The floor is cast-iron troughs extending from center to center of adjacent ribs, to which they are bolted. The roadway is of granite sets laid over 3-in. planking. This bridge was built about 40 years ago and it is said that the paving has not been renewed since the bridge was opened. The accident of which we speak came about from a barge striking the bridge. It hit one of the ribs of the middle span about 40 ft. from a pier. From each of the two outer ribs large pieces of cast iron were broken clean out, the fracture in the outermost rib extending through the spandril casting to the parapet. About 25 tons of material was broken away. For fully an hour after the accident the traffic went on uninterrupted over the bridge, no attempt being made to confine it to the part of the arch still sound. It is surmised that the granite paving itself acted as an arch, carrying the wagon traffic safe across the bridge. The granite slabs on the bridge pathways have begun to chip, apparently under end compression, indicating that they have been carrying some part of the load. None of the pavement was removed. The writer in *Engineering* believes that the main sources of support were the flooring troughs and the outer parapet, the latter in particular. This, however, could not be acting as a beam as it was cracked at the foot.

### Completion of the Battleship Oregon.

The battleship Oregon is practically completed and ready to be turned over to the government. The ship's guns are in place, and everything is in order for a trial trip. The Oregon is the largest warship ever constructed on the Pacific Coast. She is a vessel of the type of the Indiana, and on her builders' trial trip made 20 knots. The official trial trip of the vessel will probably take place in May.

### That Order for Rails for Japan.

Various papers of the country, technical and others, have within the past few weeks printed some reference to an alleged order for 10,000 tons of rails, said to have been placed with the Carnegie Steel Co. by the Japanese Government. The English paper *Invention* varies the story somewhat, saying that the Illinois Steel Co. was the successful bidder. On March 6 we published a paragraph, taken from the *Bulletin* of the Iron & Steel Association, regarding this story, in which it was declared probably erroneous. Newspaper dispatches of March 24 from Braddock, Pa., say that the Carnegie company is now working on this order, the only variation being that the number of tons is 16,000 instead of 10,000. They also say that the rails will be 60 ft. long, and will weigh 56 lbs. to the yard. The *Iron Age* last week said: "It is true that the Carnegie Steel Co. has sold 10,000 tons of steel rails to Japan."

### Launch of the Battleship Iowa.

The United States battleship Iowa, which has been building for some years at the Cramps shipyards in Philadelphia, was launched on March 28. This vessel is of about 11,410 tons. Her horse power is about 11,000 and her contract speed 16.5 knots. When ready for service the Iowa will carry four 12-in. and eight 8-in. breech-loading rifles, six 4-in. rapid fire guns, 20 six pounders, six one-pounders and two Maxim guns.

## THE SCRAP HEAP.

**Notes.**

The shops of the Baltimore & Ohio Southwestern at Washington, Ind., have been closed, and nothing is given out as to the probable time of reopening.

The Manitou & Pike's Peak road, the cog-wheel road up Pike's Peak, will open for the season with a regular train to the summit of the mountain on April 6.

The tunnel of the West Virginia & Pittsburgh, near Clarksburgh, W. Va., caved in on March 24, and, according to reports, the road will be blocked for several weeks.

At the Baltimore & Ohio dock at Fort George, Staten Island, one night last week, a car float, on which were 12 cars loaded with dressed beef and lumber, sank, in 20 ft. of water.

A fire in Lacrosse, Wis., March 24, destroying large quantities of lumber and other property to the value of $200,000, is said to have been started by a spark from a locomotive of the Chicago, Milwaukee & St. Paul. A fire at Jersey City, N. J., March 30, damaged a pier of the Erie Railroad to the extent of $30,000.

The Railroad Commissioners of Texas have ordered the railroad companies to make to them monthly reports of gross earnings, divided into freight, passenger, mail, express and miscellaneous; of operating expenses, divided into the four general classes; and of tonnage of the principal commodities, with the revenue on each.

The Mayor of the City of Charlotte, N. C., has secured a good deal of free advertising during the past two or three weeks by the announcement that he would enforce the law of that state forbidding the running of railroad trains on Sunday. It is said that the order has been obeyed by the railroads for two Sundays; but how many trains they desired to run on the Sundays in question is not stated.

In these times of dull business and dubious outlook for the future, the reader will be glad to hear of a railroad which has been obliged to increase its train service 50 per cent. We refer to the Canadian Pacific, on several branches of which, as we learn from the Manitoba *Free Press*, the trains which have heretofore run each way twice a week will hereafter run three times a week.

On Friday last freight cars were run over the Seashore Electric Railroad of Asbury Park, N. J., and over the Atlantic Coast Electric Railroad which connects that town with Long Branch. A law has been passed in New Jersey prohibiting the transportation of freight on electric roads, but it is said that by beginning freight service before the law went into effect the above-named roads secure the advantage of an exempting clause in the act.

The Pennsylvania Company has begun the construction of a large new dock at Cleveland, where large quantities of coal and ore are transferred. The Northern Steamship Company's big passenger vessels will use this dock the coming season. The Northern Steamship Company has leased 1,500 lineal feet of dockage from the Pennsylvania Coal Company at Buffalo, and it is said that a large freight house will be erected. Hitherto the vessels of this company have had no dock at Buffalo, and have delivered freight at various places in the harbor.

The Massachusetts Legislature has not as yet taken any action on the bill authorizing the construction of the proposed Union Station. The Boston *Journal* has criticised the scheme, pointing out that the provision for apportioning the expense between the city and the railroads is not adequate. The railroad companies and the Mayor are to settle the matter, subject only to an appeal to the State Railroad Commissioners in case of a disagreement; but, the *Journal* points out, the two parties first named have already agreed, so that practically there will be no appeal and no public inquiry. The bill also allows the railroads too much latitude in selling valuable real estate which will become useless to them. There is nothing to hinder them from using the money for any purpose they see fit. Prominent citizens of South Boston have protested against certain features of the Union Station plan, as it affects the streets leading across Fort Point Channel to their part of the city.

### The Association of Engineering Societies.

The January issue of the *Journal of the Association of Engineering Societies* contains the annual reports. The Western Society of Engineers withdrew in December, 1895. The Wisconsin Polytechnic Society withdrew March, 1895. The membership now consists of the Boston Society of Civil Engineers, the Civil Engineers' Club of Cleveland, the Engineers' Club of St. Louis, the Civil Engineers' Society of St. Paul, the Engineers' Club of Kansas City, the Engineers' Club of Minnesota, the Montana Society of Civil Engineers, the Denver Society of Civil Engineers, the Association of Engineers of Virginia, and the Technical Society of the Pacific Coast. The Association was organized at the beginning of 1881. We do not find any statement of the number of the present membership. An approximate idea can be obtained, however, from the number of copies the *Journal* sent out. The mailing list at the end of 1895 showed 1,477 sent to the societies. Of this 401 went to the Western Society of Engineers. Therefore, the membership after the withdrawal of that society must be about 1,000. This does not include extra copies sent to the Board of Managers, exchanges or subscribers. Probably it does include extra copies sent to authors of papers, and therefore the estimate of total membership may be a little too great. There are now 215 subscribers to the *Journal*. The finances seem to be in good shape, the excess of assets over liabilities being $224.

### Chair Cars for the Million.

The Chicago Great Western announces that it will at once supersede all ordinary day passenger cars on its lines with the latest improved chair cars. The cars have all been finished and the company's limited trains between Chicago and St. Paul have been equipped with them already. Later the company expects to add library cars to its limited trains between Chicago, St. Paul and Kansas City.

### The Reading Subway.

The Philadelphia newspapers have lately published vague rumors to the effect that the $6,000,000 project for making a depressed railroad for the Philadelphia & Reading, in Pennsylvania avenue, had encountered serious obstacles, and might be delayed indefinitely, but it is now announced that the completed plans had been delivered to the Director of Public Works, and that proposals will probably be advertised for soon.

### Railroads in Guatemala.

In an interview, which we find in a San Francisco paper, Mr. L. H. Griffith, stated to be an American business man residing in Guatemala, gives some interesting information about railroad affairs in that country. Just before he left Guatemala it was stated that the sale of the Guatemala Central road, owned by Mr. C. P. Huntington, to an English and Scotch syndicate, had been completed. The price was said to be $7,400,000 in gold. Mr. Huntington and the syndicate reached an agreement some months ago, but the government made some objection to the transfer of the concession. This objection, it was stated, had been finally overcome and the sale formally made, although the transfer of control has not yet passed. Continuing, Mr. Griffith said: "A road is now being built in the northern portion of the state, from Guatemala City, to reach Port Barrios, on the Atlantic coast. This line may divert traffic now going to San Francisco to New York. This road is being built by the government. The entire distance between the two towns is 180 miles. Sixty-five miles of this, from the Atlantic side, is now in operation. Besides this, 50 miles more are under contract. There is also a 45-mile section from the Guatemala City end to be let to contract shortly. When these two contracts are completed freight can be transferred between the terminals. The coffee shipments then may be made to New York.

"The route of the road is very rough. The cost of building is about $200,000 a mile. There are many gorges and canyons, requiring in all 35 miles of bridging in the 180 miles." Besides this important work the San Luci branch road, from San Luci south to a connection with the Occidental road at Retaluhne, is being pushed forward rapidly. This runs along the base of the mountains on the Pacific Coast side through a rich coffee belt. The road will be an important feeder. "Another important project by the Guatemalan Government is the spending of $7,000,000 at the new port of Estrapa, nine miles below San Jose. It is at the mouth of a river and dockage is there furnished for large ships. Over 7,000,000 ft. of lumber have been sent from San Francisco during the last few months. The harbor is to become the important one for the Pacific coast in Gautemala. All steamers will eventually change from San Jose to that point."

### Pacific Railroads.

The United States Senate Committee on Pacific Railroads has appointed Senators Frye, Wolcott and Brice a sub-committee to act with a similar sub-committee of the House Pacific Railroads Committee in drafting a bill providing for the settlement of the debts of the bond-aided Pacific Railroads to the Government.

### $500,000 for Street Paving.

The Board of Estimate and Apportionment of New York has appropriated $500,000 for asphalt paving. This provides for the paving of First avenue, from Twentieth street to 109th street; Madison avenue, from 125th street to the Harlem River; the east side of the Boulevard, from Ninetysecond street to 106th street; 129th street, from Seventh avenue to Eighth; Forty-ninth street, from Madison avenue to Fourth; Fifteenth street, from Union square to Irving place, and parts of Clinton place and Macdougal street.

### The Ship Canal to the Great Lakes.

A bill has been introduced in Congress providing for a commission of five engineers to report upon the best practicable route for a ship canal having 28 ft. depth connecting the great lakes with the Atlantic Ocean. Forty thousand dollars is appropriated for the expenses of the commission. We printed an account of the incorporation and plans of the company which has been formed to build this canal on March 13.

### The New Chinese Loan.

The sort of international rivalry which has existed for some time past as to which company shall have the privilege of lending money to China appears to have been settled in favor of an Anglo-German group of financiers, who are reported to have arranged a 5 per cent. loan for £16,000,000 at 94 per cent. In connection with this transaction it may be well to point out that when this new loan is placed, the security which China can offer by an assignment of the customs revenue will be pretty well exhausted. In round figures the free revenue derived from the maritime customs, after allowing for cost of collection, amounts to an average of about £3,200,000 per annum. Including the £16,000,000 of the Russo-Chinese loan the existing charges upon that revenue amount to about £1,700,000, and if we add to this the charge for interest and sinking fund upon the new issue, there is evidently only a very small margin left for future borrowings or other contingencies. This fact is not likely to mar the success of the new loan, but it is well to bear in mind that China has practically no other revenue to assign to its foreign creditors, and that the customs receipts are not an inexhaustible quantity.—*The Economist.*

### Taxes on Brooklyn Elevated Railroads.

Judge Gaynor, in the Supreme Court at Brooklyn, N. Y., has dissolved the temporary injunction restraining the Registrar of Arrears from selling the property of the Brooklyn and Kings County elevated roads for taxes. The company had protested on the ground, chiefly, that the city had wrongfully allowed high speed cars on the surface of the street, thus impairing the value of the elevated road. In his decision the Judge says that the claim of the Brooklyn company that the valuation made by the assessors is excessive, has no foundation. The 20 miles of structure of the company is valued upon the assessment rolls at only $2,903,965, making a tax of about $83,000 each year. And yet the company is bonded for $12,968,000 and stocked for $13,283,000, making a total of over $26,000,000. If the company's structure is not worth the assessor's valuation of $2,903,956, what is to be said of this total of $26,000,000 in bonds and stock? What was it issued for? If this assessed value were doubled, and put at $6,000,000 (for illustration), or trebled, and put at $9,000,000 in order to get the actual value, the disparity between the actual value and the amount of bonds and stocks would still be striking. And due consideration in this connection of the earnings of the road makes no better case for the company. The papers before me show that during the time in question it has been carrying an average of upward of 95,000 passengers a day. This enables the gross receipts to be accurately stated. In fact, the company's report to the Railroad Commissioners in 1893 (the year in question) gives the gross receipts from operations as $1,935,683.84, and net earnings as $843,970.28. This is a net income of over 28 per cent. on the value, which the assessors have placed upon the company's structure (viz., $2,903,965, or in round numbers, $3,000,000), or of over 14 per cent. on double that value (viz., $6,000,000), or of over 9 per cent. on treble the value (viz., $9,000,000).

These bonds are not upon the actual property of the company alone, which it says the assessors have excessively valued at less than $3,000,000, but also upon the valuable franchises which have been given to it by the government. For the company to issue bonds on such franchises, the gift of government to it, and then say to the government that it cannot or shall not pay any taxes upon its actual taxable property out of its income upon actual investment, because it first has to pay interest upon such bonds, is a position which cannot be justified either in law or in morals.

The same opinion is made to apply also to the Kings County company, whose line, nine miles long, is assessed at $1,111,190, although the stock and bonds of the company aggregate $12,750,000. The company seems to labor under the false notion that its obligation to pay interest upon this grossly excessive issue of bonds is superior to its obligation to pay its just share toward the support of the government which gave it life and protects it, and makes it permissible for it to refuse to pay and try to shoulder that share off upon the other taxpayers. Government which permitted the like could not in the nature of things long endure. The motion to continue the temporary injunction is denied, and the said injunction is vacated.

### Grants of Government Lands to Railroads.

Secretary Hoke Smith has approved grants of lands to railroads as follows: Northern Pacific, 587,647 acres in the Bismarck district, 26,824 acres in the state of Washington, 608,452 acres in Montana, 41,621 acres in Idaho; Southern Pacific, 8,354 acres in California; Central Pacific, 5,147 acres in California; New Orleans Pacific, 1,349 acres in the New Orleans district.

## LOCOMOTIVE BUILDING.

The St. Louis, Vandalia & Terre Haute is asking bids for building 24 mogul engines.

The Seaboard Air Line has awarded a contract for 12 engines to the Pittsburgh Locomotive Works.

The New York, New Haven & Hartford has placed an order with the Schenectady Locomotive Works for building 30 locomotives, and with the Rhode Island Locomotive Works for 10.

The Receivers of the Baltimore & Ohio have directed the mechanical department of the company to prepare specifications for 75 new locomotives. These engines will be built by outside shops, all the company's shops being now operated on full time on repair work. About 15 of the engines will be for passenger service.

## CAR BUILDING.

The West Shore is to build about 250 coal and box cars, to fill vacant numbers.

The Elliott Car Works, of Gadsden, Ala., has received an order from the Seaboard Air Line for 500 box cars.

It is stated that contracts for about 100 gondola cars for the Pennsylvania lines west of Pittsburgh will be awarded shortly.

The Philadelphia & Reading has ordered from the Union Car Company, of Depew, N. Y., 25 improved Wickes patent refrigerator and ventilated cars.

The Seaboard Air Line put on an extra force of men at its car shops at Portsmouth, Va., last week and began work on 100 of the new box cars which the company will build at these shops.

Receiver Murray, of the Baltimore & Ohio, in a statement issued last week said that the receivers had decided to ask authority from the court to build 5,000 cars. A

very large proportion will be coal cars. The specifications for the cars are now being prepared.

The receivers of the Baltimore & Ohio have been authorized by the United States Circuit Court to conclude an agreement made before the receivership with the Monongah Coal & Coke Co., of West Virginia. It provides for the building by the coal company of 100 cars for use on the Baltimore & Ohio lines for which a mileage rate of 6 mills is to be allowed. The cars are to be turned over to the Baltimore & Ohio when the mileage payments reaches a sum equal to the cost of the cars to the coal company, with interest. These cars have just been placed in service. They were built by the South Baltimore Car Works.

## BRIDGE BUILDING.

**Aitkin County, Minn.**—The President of the United States has approved the act authorizing the construction of a bridge across the Mississippi River in this county.

**Annapolis, Md.**—A bill has passed the Senate requiring the Commissioners of Anne Arundel County to build a bridge over Curtis Creek.

**Birmingham, Ala.**—Bids will be received by the County Commissioners until April 6 to build two iron bridges—one at or near Short's Ferry and one at or near Goggan's ferry—both on Warrior river. These bridges will cost between $5,000 and $6,000 each.

**Brockville, Ont.**—The Brockville & New York Bridge Company has decided to amalgamate with the St. Lawrence Railway Company of New York. The latter holds an international bridge charter from the United States Government, while the Brockville has a charter from the Canadian Government. The capital stock of the amalgamated company, which will be known as the Brockville & St. Lawrence Bridge Company, is $2,500,000. Some work has already been done on the bridge, which will span the St. Lawrence River between Brockville, Ont., and Morristown, N. Y..

**Bryan, Brazos County, Tex.**—Application has been made for a charter for a bridge across the Brazos River at Pitt's Ferry. The incorporators of the company are William Koppe, H. Rhode, J. W. Johnson, G. S. Parker, F. E. Mistrot, T. R. Batte, J. N. Cole and others. The capital stock is $20,000.

**Chester, Pa.**—Miners have reported favorably on the erection of a county bridge over Chester Creek at Ninth street.

**Cincinnati, O.**—The Kenton & Campbell County Bridge Company's bridge at the foot of Twelth street across the Licking River between Covington and Newport was sold March 25 by Special Commissione. Joseph Finnel of the U. S. Circuit Court. The sale was made on a foreclosure of mortgage bonds for $150,000. The bridge was sold to William B. Sanders of Cleveland, O., who was the only bidder, for $125,000. Sanders, it is understood, bid the bridge in for the bondholders.

**Cleveland, O.**—Council has accepted the proposition of the Erie to widen the old river bed at the Willow street bridge for a distance of 800 ft. for $30,000. The work will be started at once.

**Corpus Christi, Tex.**—The House Committee on Commerce reports favorably on the bill authorizing the Aransas Harbor Terminal Railway to build a bridge across the Corpus Christi Channel near this place.

**Easton, Pa.**—The Committee on Bridges of the Freeholders of Warren and Hunterdon counties have decided to rebuild the bridge at the Warren Paper Mills. The Warren county committee met at Carpenterville and decided to contract for the rebuilding of the bridge over the Pohatcong at that point.

**Edmonton, N. W. T.**—The Hudsons Bay Co. has subscribed $5,000 towards the new bridge to be built across the Saskatchewan River.

**Fairfield, Me.**—A committee of three has been appointed to place the contract for a steel bridge near here to replace the one damaged by the recent floods.

**Galveston, Tex.**—Bids will be received by the Commissioners of Galveston and Harris counties until April 7 for an iron bridge over Clear Creek near the International & Great Northern Railroad bridge. Address W. V. Westerlage, County Commissioner, Galveston County.

**Hartford, Conn.**—The Bridge Commission at this place has voted to build a temporary bridge to replace the one recently carried away by the ice. Bids will be received until April 8. The bridge will be about 1,100 ft. long, and 28 ft. above the low water mark.

**Huntingdon, Que.**—The contract for building a steel bridge at Holbrooks, Huntingdon, has been awarded to the Imperial Bridge Co., of Montreal.

**La Salle, Ill.**—A 300-ft. highway bridge in three spans is proposed over Big Vermilion Run at this place. C. H. Nicolet is City Engineer.

**Lewiston, Me.**—The Lewiston and Auburn Joint Committee on Bridges will advertise for proposals for a steel bridge at the Cedar-Broad street site. The bridge is to be of seven spans of about 102 ft. each.

**New York.**—A contract for making borings in the East River has been let to the New York & New Jersey Well Co. The contract specifices that on th Brooklyn side there shall be eight holes bored, one of 85 ft. at $1,200, and seven of 80 ft. at the rate of $10 per foot. On the New York side eight holes will be bored to a depth of at least 80 ft. at $10 per foot. It is provided that the holes shall be sunk at least 10 ft. into solid rock. The contract had originally been awarded to Stearns Bros., of Brooklyn, but they withdrew their bid.

**Philadelphia, Pa.**—Twelve bids were received recently by the Park Commission for a skew arch bridge in Fairmount Park. The contract was awarded to Michael McManus, his bid being $27,743.

**St. Charles, Mo.**—The House, at Washington, has passed Representative Treloar's bill for a bridge over the Missouri River at St. Charles. This bill, as has been heretofore stated, looks to the completion of an electric line from St. Louis to St. Charles.

**Spokane, Wash.**—At a recent meeting of the City Council it was decided to build a new highway bridge at Mission street.

**Stanley, N. B.**—The Dominion Government will shortly reconstruct the bridge over the Nashwaak River near this place.

**Tarboro, N. C.**—We recently noted the date for the reception of bids for the bridge over the Tar River near this place. The King Bridge Co. has secured the contract at a bid of $14,950. The superstructure of the bridge will be 510 ft. long of steel. There will also be 30 ft. of earth abutment at each end. The bridge will have an 18-ft. roadway with a sidewalk on each side.

**Topeka, Kan.**—The bids for the construction of the new Melan bridge across the Kansas River, in Topeka, were opened last week, and were as follows: Keepers & Thatcher, Detroit, $125,000; Sooysmith & Co., New York, $142,225; Christie & Son, Chicago, $144,000; Richardson & Young, Chicago, $131,960; Willard & Connell, Guthrie, $144,900; Ulrich Bros, Manhattan, $134,000. The award of the contract was deferred, to await the disposition of the bonds voted by the company to build the bridge, an injunction having been filed by Richardson & Young.

## RAILROAD LAW—NOTES OF DECISIONS.

### Powers, Liabilities and Regulation of Railroads.

It is laid down in Arkansas that the separate coach act, requiring railroads to provide separate waiting rooms for the white and African races, at all their passenger depots, does not require the erection of passenger depots at stations where there were none.[1]

It is also held, in the same case, that a store on a railroad's right of way, where railroad tickets were sold, and which was resorted to by passengers while waiting for the cars, and over which the company had no control, was not a passenger depot, within the meaning of the separate coach act, requiring the maintenance of separate waiting rooms therein.

In the Federal Court it is held that an Ohio railroad corporation can mortgage after-acquired property, acquired either by itself or by any successor in title exercising the same franchise or similar franchises granted by the same sovereign.[2]

In Michigan the non-payment of an assessment levied on a portion of the roadbed of a railroad does not authorize the sale of such portion to satisfy the assessment.[3]

In Missouri plaintiff's grantor, in 1873, surveyed and filed a profile line of a proposed railroad, obtained a conveyance of a right of way from the owner of land, and took possession, constructed its roadbed, and established its grade. In 1881 the work was renewed, and continued till the time of bringing suit. Plaintiff's right had never been questioned by the grantor of the right of way or by any subsequent owner of the land The Supreme Court holds that plaintiff need not resort to condemnation proceedings before laying tracks upon such right of way.[4]

The Supreme Court of Illinois rules that Trustees in charge of a railroad whose main track is all outside the state, but whose trains are brought into the state over the tracks of another company, are "operating a railroad in this state," within the meaning of the statute, requiring those "owning, operating or constructing a railroad in this state" to return schedules of its taxable property.[5]

In the Federal Court it is declared that it is the settled policy of courts to treat a railroad as an entirety, and prevent its severance, if possible.[6]

The Supreme Court of Texas rules that a conductor is under no obligation to rouse a sleeping passenger, who thereby is carried beyond his destination.[7]

### Injuries to Passengers, Employees and Strangers.

In Ohio a railroad is liable to a passenger injured, while carrying a sick fellow-passenger to another car under the direction of the conductor, by reason of the difference of level between the cars, of which the conductor gave no warning, but could have known, and given warning, by the use of reasonable care.[8]

In Louisiana a livery stable keeper is liable for the negligence of his driver in attempting to cross a railroad track in front of an approaching train, with a tallyhoe laden with passengers, where the passengers did not undertake the management of the driver.[9]

In Texas it is held that where a passenger, on alighting at a regular station, crosses the track at a public crossing in the rear of the train, and is run over by the train backing up without notice, the railroad company is liable.[10]

In Massachusetts it is held that an experienced freight handler, who has been in the employ of a railroad for several years, a part of whose duty has been to hook up the doors of grain cars preparatory to loading them, assumes the risk of injury by falling of a door through an obvious defect therein which would cause it to fall when a heavy load was emptied into the car.[11]

In Missouri a railroad had a rule which instructed conductors to require brakemen to ride on the top of the train on down grades The conductor directed plaintiff to ride in the engine because of the cold, where he was injured in a down grade. The Supreme Court rules that plaintiff was not negligent.[12]

In New York it is decided that one who, while working for the first time on a railroad, and after being employed only an hour, is injured, in throwing rails off a car, by a rail projecting from a car in the rear by reason of the absence from the car of a drawhead, is not chargeable with negligence for having stood on the platform of his car, though directed not to do so, he not having been warned of any danger.[13]

In the same state it is ruled that whether a switchman who, while standing on one track, near a switch, waiting for an engine to come down on the next track, was struck by the engine coming on the track on which he was standing, was guilty of contributary negligence, is a question for the jury; their having been no light on the end of the engine towards him, though it was night, and the conductor having told him that the engine would come on the next track.[14]

In Missouri there was an agreement between defendant and another railroad company by which continuous trains were run over the connected roads. Defendant had the exclusive right to employ and discharge trainmen, and was required to furnish and repair the locomotives for both roads, but they were under the control of the other road while they were on its branch, and the men were paid by each company in proportion to the work done on the respective roads. Plaintiff was injured on the other company's road by a defective engine. The Supreme Court rules that as to him defendant was liable.[15]

In this case it is also held that where it appears that the driving rod of an engine might have been broken by either a defective alignment, or by rough track or by cold weather, it will be resumed that the defendant anticipated the latter conditions by using due care in supplying such appliances as would overcome them.

In Arkansas it appeared that plaintiff, one of a road crew, working at the north end of the trestle, was ordered to cross to the south end, at which an engine was standing; that, when half way across, the engine moved slowly towards him; that two companions avoided a collision by stepping on cap sills projecting from the side of the trestle; that plaintiff, in endeavoring to get on the engine, was hit, and knocked off the bridge. The Supreme Court rules that plaintiff could not recover because of contributory negligence.[16]

In New York it is said that though a person injured at a crossing was familiar with the dangers of the crossing and the manner in which it was operated, it is a question for the jury whether he was guilty of contributory negligence, where buildings required one to be very near the track to observe an approaching train, and there was evidence that he stopped, looked and listened; that fog obstructed the view, that the train was running very fast; and that no signals were given.[17]

The Supreme Court of Kansas rules that when an engineer sees an adult person walking on the track in front of the train, who appears to have the use of his senses, and not to be under any physical disability, he may presume that the trespasser will heed the warnings given, and step from the track in time to avoid injury.[18]

In Pennsylvania, a view of the tracks, in the direction from which the train came, otherwise obtainable for 900 ft., was obstructed. further than for 100 ft., by smoke left by a train which had just passed; and plaintiff's decedent, after stopping to look and listen 15 ft. from the crossing, but without waiting for the smoke to rise, attempted to cross five tracks, and was killed while walking his horse over the fifth. The Supreme Court holds, that though the train was running 40 miles an hour, without warning or headlight (it being at dusk), plaintiff could not recover.[19]

In New York it is held that a railroad which constructs its tracks in a street under municipal authority is not obliged to restore the street to such a condition as, under no circumstances, can any one be injured in using it, but its duty is simply to use reasonable care in restoring the street.[20]

[1] St. L., I. M. & S. v. State, 31 S. W. Rep., 570.
[2] Compton v. Jesup, 68 Fed. Rep., 263.
[3] D., G. H. & M. v. Grand Rapids, 63 N. W. Rep., 1007.
[4] K. C. & S. E. v. K. C. & S. W., 31 S. W. Rep., 451.
[5] Q. O. & K. C. v. People, 41 N. E. Rep., 162.
[6] Compton v. Jesup, 68 Fed. Rep., 263.
[7] Tex. & P. v. Alexander, 30 S. W. Rep., 1113.
[8] L. S. & M. S. v. Salzman, 40 N. E. Rep., 891.
[9] Perez v. N. O. & L. R. 17 South. Rep., 869.
[10] D. & O. C. v. Reeman, 32 S. W. Rep., 45.
[11] Cassaday v. B. & A., 41 N. E. Rep., 129.
[12] Hurlbut v. Wabash, 31 S. W. Rep., 1051.
[13] Lucco v. N. Y. C. & H. R., 34 N. Y. S., 277.
[14] O'Loughlin v. N. Y. C. & H. R., 34 N. Y. S., 297.
[15] Hurlburt v. Wabash, 31 S. W. Rep., 1051.
[16] St. L. & S. F. v. Blovd, 31 S. W. Rep., 457.
[17] Wilcox v. N. Y. L. E. & W., 34 N. Y. S., 744.
[18] Campbell v. K. C., Ft. S. & M., 40 Pac. Rep., 997.
[19] Beynon v. P. R. R., 32 Atl. Rep., 84.
[20] Wood v. Third Ave., 34 N. Y. S., 698.

## MEETINGS AND ANNOUNCEMENTS.

### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Chicago & Eastern Illinois*, quarterly, 1½ per cent. on the preferred stock, payable April 1.

*Delaware, Lackawanna & Western*, 1¾ per cent., payable April 20

*National Railway Co.*, quarterly, 1½ per cent., payable April 10.

### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Chicago & Alton*, annual, company's office, Chicago, April 6.

*Chicago & North Michigan*, annual, company's office, Traverse City, Mich., April 15.

*Chicago & West Michigan*, annual, company's office, Grand Rapids, Mich., April 15.

*Cleveland, Lorain & Wheeling*, special, company's office, Hickox Building, Cleveland, O., April 10.

*Joliet & Chicago*, annual, company's office, Chicago, April 6.

*Lake Shore & Michigan Southern*, annual, May 6.

*Michigan Central*, annual, May 7.

*New York Central & Hudson River*, annual, company's office, Union Station, Albany, N. Y., April 15.

*Panama*, annual, company's office, 29 Broadway, N. Y., April 6.

*Pittsburgh, Cincinnati, Chicago & St. Louis*, annual, Penn avenue and Tenth street, Pittsburgh, Pa., April 14.

*Sterling Mountain*, annual, office of W. B. Anderson, 44 Wall street, New York, April 7.

### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Railway Association* will hold its spring meeting at the Burnett House, Cincinnati, O., April 15.

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago. Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month. at 2 p m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March May, September and November. at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736–1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

**Association of Railroad Air Brakemen.**

The date of the annual convention at Boston is Tuesday, April 14, instead of April 4, as was stated through a typographical error in this column last week. The headquarters will be at the American House, Boston.

**Freight Claim Association**

The Freight Claim Association will hold its annual meeting in Chicago on Wednesday, May 6. The headquarters of the members will be at the Victoria Hotel. S. A. Mehorter, of the Pennsylvania Railroad, Philadelphia, is Secretary.

**Engineers' Club of Cincinnati.**

At the March meeting of the club 19 members and five visitors were present. Two new members were elected. Mr. George Hornung read a paper giving a review of the various plans proposed for improving the water supply for Cincinnati, from 1865 to 1895, and a consideration of the properties of the Ohio River water as influencing the designing of a new plant.

**Canadian Society of Civil Engineers.**

The Society met on Thursday evening, March 26, at their rooms, 112 Mansfield street, Montreal. A discussion was held on Mr. Dawson's paper on "Retaining Walls." Discussion was also had on the following resolution: "That Engineering Works should be constructed by day's work, under the immediate direction of a Civil Engineer instead of being done through a contractor." Mr. Cyrus Carroll's paper on "The Effects of Engineering Works on Water Currents."

**American Railway Association.**

The spring meeting of the American Railway Association will be held at the Burnett House, Cincinnati, O., on Wednesday, April 15, at 11 a. m. Reports will be presented by the following committees: Executive Committee, Committee on Train Rules, Committee on Car Service, Committee on Safety Appliances; Joint Committee on Interlocking and Block Signals; Committee on General Regulations for Employees, Nominating Committee and Committee on Standard Wheel and Track Gages. The annual election of officers will take place at this meeting. Two members of the Executive Committee, three members of the Committe on Train Rules and three members of the Committee on General Regulations for Employees will also be elected.

**Engineers' Club of Philadelphia.**

At the meeting on Saturday, April 4, Prof. Edgar Marburg will make an address on "Cantilever Bridges," illustrated by lantern views.

At the meeting of the Club on March 21 a number of papers were read on "Sewage Methods." Mr. Thomas G. Janvier described the sewage disposal works at Wayne, Pa., which were built about four and a half years ago, basing his description on a pamphlet issued some time ago by Colonel Waring, who designed the system.

Mr. William Easby described briefly various methods of sewage disposal, illustrating the plants by lantern slides. He spoke of the plant at Moon Island, near Boston, which he thought the best example of main drainage for the disposal of sewage; the sewage farm at Berlin, Ont.; the broad irrigation field at Pullman, Ill.; filter beds at Summit, N. J.; South Framingham, Mass., and other methods in use at Canton, O.; Long Branch, N. J., and in England. Mr. John C. Trautwine, Jr., described a small experimental filter near the Spring Garden pumping station at Philadelphia, which had been set up as an experiment to see what could be done by rapid straining to improve the appearance of water furnished certain districts of the city.

## PERSONAL.

—Mr. Frank Sweeney, formerly Grand Master of the Switchmen's Mutual Aid Association, died at Chicago March 27.

—Mr. C. V. Lewis, lately Assistant General Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis, is to enter the service of the Baltimore & Ohio.

—Mr. W. L. Darling, who has been an Assistant Engineer of the Northern Pacific since 1879, has been appointed Chief Engineer.

—Mr. A. P Grenough, Superintendent of Telegraph of the Rock Island & Peoria, has been appointed General Superintendent, to succeed Mr. H. B. Sudlow, resigned.

—Mr. B. W. Bigoney has been appointed Auditor of Disbursements of the Erie road, vice Mr. N. S. Rutter, resigned. Mr. Bigoney is now an officer of the company's auditing department at Cleveland.

—Major Edward Leslie, whose name is well-known to railroad men through his part in the invention of the Leslie rotary snow plow, died suddenly at Paterson, N. J., March 26, where he had lived for many years.

—Mr. W. W. Peabody, Jr., has been appointed Coal Traffic Manager of the Baltimore & Ohio Southwestern. Mr. Peabody is a son of the Vice-President and General Manager of the company, and has recently been his assistant.

—Mr. George A. Nettleton has been appointed Chief Engineer of the Ann Arbor road, and will also have charge of the maintenance of way and building department. This office was abolished a few months ago, when Mr. H. E. Riggs resigned.

—Mr. I. W. Fowler, General Superintendent of the St. Louis, Chicago & St. Paul road, has resigned that office, taking effect from April 1. He has made no definite plans for future work, but will take a short vacation before accepting another railroad position.

—Mr. D. E. McMillan, of Chicago, is the new General Freight Agent of the Columbus, Sandusky & Hocking road. Mr. McMillan, who is 35 years of age, has for the last eight years been Chief Clerk to the General Freight Agent of the Chicago & Grand Trunk.

—President C. P. Clark of the New York, New Haven & Hartford, left New Haven, Conn., last week for a trip to California, which will last about four weeks. He is accompanied by his family and a party of friends and expects to visit San Francisco, Portland and Puget Sound before returning.

—Mr. Ray Knight, formerly Division Freight Agent of the Southern Railway Company, with headquarters in Selma, Ala., is now Freight Agent and Traffic Manager of the Anniston Pipe & Foundry Company, the Hercules Pipe & Foundry Company and the Anniston Iron & Steel Company.

—Mr. James B. Monroe, a former well-known railroad officer of Toledo, O., died in Brooklyn on March 26. He was best known among railroad men as General Agent of the Dayton & Michigan road, now operated by the Cincinnati, Hamilton & Dayton, an office which he held for nearly 20 years. For some years he was a Vice-President of the Toledo Produce Exchange.

—Mr. C. F. Mayer has been appointed Assistant General Freight Agent of the Columbus, Hocking Valley & Toledo road. This is a new office on this road. Mr. Mayer has heretofore been the Chief Clerk in the general freight department and has held the position since December, 1883. Before going to the Hocking Valley road in 1881 Mr. Mayer was for some time with the Scioto Valley road in Ohio as a clerk in its general freight office.

—Mr. A. S. Ostrander, Superintendent of the Air Line Division of the New York, New Haven & Hartford, has resigned and will take the superintendency of a quarry corporation at Meriden, Conn. Mr. F. C. Payne, Superintendent of the Danbury Division, will succeed him. Mr. J. E. Martin, Superintendent of the Shepaug, Litchfield & Northern road, will have his duties extended to the Danbury and Norwalk Division, with headquarters at Danbury, Conn.

—Mr. M. F. Bonzano has been appointed General Superintendent of the South Jersey road to succeed Mr. Henry Wood, who was Manager and who retired some months ago to become General Manager of the Choctaw, Oklahoma & Gulf road. Mr. Bonzano has been Assistant Manager of the road since December, 1894. That office is now abolished He was previously Division and General Superintendent of the Philadelphia & Reading for a number of years.

—The resignation of Mr. W. J. Spicer as General Manager of the Chicago & Grand Trunk and the other lines of the Grand Trunk west of the Detroit River, which was reported early in the year, is officially announced by President C. M. Hays, of the Grand Trunk, under date of March 26. The further announcement is made that the office will be abolished on April 1 and the duties assumed by Mr. Hays. It appears from other information that Mr. Spicer has severed all connection with the Grand Trunk.

—Mr. John Denair has been appointed Division Superintendent of the Atlantic & Pacific, with office at The Needles, Cal. Mr. C. R. Perry, formerly Trainmaster, has been appointed Division Superintendent at Gallup, Ariz. Mr. Denair was formerly Superintendent of Transportation, but that office has been abolished as well as the offices of Trainmaster on the several divisions, and hereafter the operating department will be in charge of the General Superintendent, Mr. A. G. Wells and the two Division Superintendents named.

—Mr. George F. Black has been appointed First Assistant Engineer of the Maine Central, succeeding to that office on the promotion of Mr. Robinson to be Chief Engineer. Mr Black has been connected with the Maine Central since his graduation from the Maine State College in 1886. He was engaged as Assistant Engineer on the erection of the company's shops at Waterville and of its Union station at Portland. In September, 1888, he became Assistant Engineer and Acting Roadmaster on its Mountain Division, retaining those offices until 1894, when he was transferred to Portland.

—Brigadier-General Thomas Lincoln Casey, U. S. A., retired, died at his home in Washington, D. C., on the afternoon of March 25. General Casey retired from active service as Chief of Engineers last May. He was born at Madison Barracks, Sackett's Harbor, N. Y., May 10, 1831. His father was General Silas Casey, of the army. He entered the Military Academy in 1848, graduated at the head of his class, entered the Corps of Engineers at once, and served in that corps until his retirement. Since his retirement he had been on special duty in charge of the building of the Congressional Library.

—Mr. Herbert C. Robinson, Assistant Engineer of the Maine Central, has been promoted to be Chief Engineer, to succeed the late Mr. William A. Allen, who met with a tragic death, as reported last week. Mr. Robinson has been in the civil engineering department of the Maine Central since May, 1893, and is now 39 years of age. He has been engaged in engineering work since 1873, when he entered the office of the City Engineer of Portland, Me., spending seven years there. Afterward he went to South America, and returning to Maine did a good deal of work in railroad surveying, until his appointment on the Maine Central.

—Mr. John Earls, General Freight Agent of the Grand Trunk, with headquarters at Hamilton, Ont., has been superannuated. He entered the company's service in 1862, and after serving as Clerk at various points on the company's lines was made Chief Clerk in the general freight office at Toronto in 1892. Three years later he became Assistant General Freight Agent, and in 1892 was made District General Freight Agent of the Great Western and Grand Trunk lines west of Toronto. He also filled for a number of years the position of Chairman of the Canadian Joint Freight Classification Committee and President of the General Freight Agents' Association of Canada.

—Mr. George T. Jarvis, now Assistant General Superintendent of the Lake Erie & Western, has been appointed Receiver of that division of the main line of the Louisville, Evansville & St. Louis road, between New Albany and Mount Vernon, Ill. The former Receivers were Mr. J. H. Wilson, of Wilmington, Del., and Mr. E. O. Hopkins, the latter also Vice-President and General Manager of the Railroad. They continue as Receivers of the remaining divisions of the company's lines. Mr. Jarvis will resign from the Lake Erie & Western. He went to that road in 1891. Formerly he had been Superintendent of the Baltimore & Ohio, in Ohio, and of the Duluth, South Shore & Atlantic and Mexican Central.

—Mr. William H. Starbuck, who was active in the financial management of a number of railroads, died at his home in New York City on March 29. His first connection with railroads was with the Oregon Railway & Navigation Co., being associated with Mr. Henry Villard about 1879. He was also actively engaged in the completion of the Northern Pacific road, and became President of the Housatonic road in New England in 1888, holding that position until 1892, being at that time also a director of the New York & New England. In 1892 he became President of the Oregon Improvement Co., which had just been taken out of the control of a receiver, and he continued in that office until last June when he retired from active life.

—Major A. H. Johnson, Engineer of Maintenance of Way of the Baltimore & Ohio, has resigned, to take effect in July. No successor will be appointed, the office being consolidated with the engineering department, under Chief Engineer William T. Manning. Major Johnson was injured in an accident on the Ohio River road about five years ago, and since that time has suffered considerable inconvenience from his injuries. He intends to remove to his home, near Manassas, Va., where he has a large farm. Major Johnson is now 60 years old and has been connected with the Baltimore & Ohio for 16 years. He was Chief Engineer of Construction of the Old Manassas road, and was Division Engineer of Maintenance of Way of the Baltimore & Ohio before becoming the head of the department.

—Mr. Harry M. Keim, Vice-President, Secretary and Treasurer of the Cleveland Terminal & Valley road, has resigned to take effect April 1. Mr Keim became connected with the Valley road early in 1890, shortly after the Baltimore & Ohio had secured possession of the property, being appointed Treasurer of the road. He afterward became Secretary also, and in June, 1892, was appointed Receiver of the road with the late J. K. Bole. Mr. Keim remained Receiver until the recent reorganization, and when the new company was formed he was appointed Secretary and Treasurer. Mr. Keim is a younger brother of the late Mr. George DeB. Keim, at one time a Receiver of the Philadelphia & Reading. The wife of Mr. C. F. Mayer, recently President of the Baltimore & Ohio, who died last week was a sister.

—Mr. Nicholas J. Powers, for years General Passenger Agent of the Grand Trunk, has retired from that office. Mr. Powers has been General Passenger Agent of the company since 1892, but his connection with the company and the Great Western goes back to 1859, a continuous service of 37 years. His official record is very much like that of many other officers of the Grand Trunk who have risen to be heads of departments. He had a long term of service as Clerk and in other subordinate positions, being transferred from one department to another. His longest service was in the accounting department. He was Auditor and Accountant of the Great Western at the time of the consolidation with the Grand Trunk and became Assistant Accountant of the consolidated company. In 1886 he was Secretary of the Audit Board and in 1892 was General Passenger Agent.

—Mr. Waterman Stone died at his home in North Providence, R. I., on March 30, at the age of 49. He was a son of L. M. E. Stone, a well known engineer, and was for many years Superintendent of the Providence, Warren & Bristol Railroad. In 1889 he went to Kansas City, where he was General Superintendent of the Kansas City Elevated Railroad. He returned East about a year ago and had charge of the construction of an electric railroad between Fall River and New Bedford, Mass., Mr. Stone was the first Secretary of the American Society of Railroad Superintendents and held the office until he went to Kansas City. He was an associate of the American Society of Civil Engineers, and while in Kansas City was Secretary and Treasurer of the Engineers' Club there. His character and worth are indicated by the offices which he has held and his kindly disposition is well known to all who were acquainted with him.

—General George H. Nettleton, President and General Manager of the Kansas City, Fort Scott & Memphis, and the various roads operated in connection with that line, whose serious illness was reported last week, died in Kansas City on March 26 of paralysis. General Nettleton was born in Massachusetts, but had lived in the West since 1852, when he became an assistant engineer on an Illinois road. For many years past he has been one of the best known railroad men in the western states, where his experience in railroad construction and operation had been extensive. He had been General Superintendent or General Manager of the Hannibal & St. Joseph, the Atchison, Topeka & Santa Fe, the Atchison & Nebraska, the Kansas City, St. Joseph & Council Bluffs and other roads. In 1874 he became General Manager of the Kansas City, Fort Scott & Gulf, and held that position up to his death. For a time he was General Manager of other roads as well, but gradually retired from these various offices to give his whole time to the development of the Kansas City, Fort Scott & Memphis. In 1888 he was elected President of the company. He had

been for some years previously President of his subsidiary corporations, the Kansas City, Memphis & Birmingham and other roads.

—Mr. Charles E. Smart, General Master Mechanic of the Michigan Central, died at his home in Jackson, Mich., on March 29. He had been ill only since Thursday of last week. Mr. Smart had been General Master Mechanic of the Michigan Central since May, 1885, having risen to that office from the engine board. He was born at Rochester, N. H., in 1840, and after serving as machinist apprentice in the East, went to Niles, Mich., in 1856, where he entered the railroad shops. In 1860 he went to Vicksburg, Miss., working on the railroad between Vicksburg and Jackson, but remained there only a few months, when he returned north, and shortly afterward went to Cuba in charge of the machinery on a sugar plantation. In the summer of 1863 he worked in the shops of the Chicago, Burlington & Quincy, at Quincy, Ill., but again returned to Cuba for a short time In 1865 he was with the South Bend Iron Works as foreman of its shops, and remained there until 1872, when he became a locomotive engineer on the Missouri, Iowa & Nebraska road. Two years later he went to the Michigan Central as a locomotive engineer, and in 1875 became Master Mechanic of the Mackinaw Division in charge of the locomotive and car departments. That office he held for 10 years, until he became General Master Mechanic.

—Mention was made in this column last week of the resignation of Mr. George B. Hazlehurst as General Superintendent of Motive Power of the Baltimore & Ohio, and a brief sketch of his connection with that road was given. That account, however, was somewhat inaccurate and misleading, and we are glad to be able to publish this week a more full account of Mr. Hazlehurst's very honorable railroad career. He was educated as a civil and mechanical engineer, and after leaving college entered the service of a large local iron manufacturing company engaged in building stationary and marine engines and boilers, steam vessels, bridges, sugar mills, etc. His health failing through close confinement, he entered the Baltimore & Ohio railroad service as Chainman in the Engineering Department in February, 1881. He was rapidly promoted in this department and engaged on many different lines of work, until 1883, when he was appointed assistant to the Consulting Engineer, the late Jas. L. Randolph (M. Am. Soc. C. E.). In this capacity he designed and executed many large projects. In 1885 he was made Engineer of Bridges, designing and building in both the Baltimore & Ohio shops of which he had charge, and in contract shops, several hundred bridges from 10 ft. span to 520 ft. span. In 1887 he received the additional title of Engineer of Tests, and all the work of that important department was added to his duties. On Dec. 1, 1889, he was appointed Acting General Superintendent of Motive Power. In 1891 was confirmed in that position, and given the full title he of General Superintendent of Motive Power, which he held until his resignation on March 19 last. Mr. Hazlehurst has been a member of the American Society of Civil Engineers since 1888.

## ELECTIONS AND APPOINTMENTS.

*Austin & Northwestern.*—The stockholders have re-elected the following officers: Thomas H. Hubbard, of New York, President; A. N. Leitnaker, of Austin, Vice-President and Treasurer; J. P. Lawless, of Austin, Secretary; C. C. Cane, of Houston, Assistant Secretary and Assistant Treasurer.

*Baltimore & Ohio.*—The following appointments in the traffic department are announced: C. V. Lewis, formerly Assistant General Freight Agent of the Big Four and previously with the Missouri Pacific, has been appointed Freight Claim Agent in place of Taylor Myers, resigned. J. A. Murray, appointed Coal and Coke Agent, in charge of the coal and coke traffic east and west of the Ohio River, with headquarters at the Central Building, Baltimore; Mr. Murray was the private secretary of General Traffic Manager Harriett, resigned. George J. Lincoln, appointed Division Freight Agent, in charge of Philadelphia Division, with headquarters at 400 Chestnut street, Philadelphia, Pa. Mr. Lincoln has been City Freight Agent in Philadelphia. E. M. Davis, appointed Division Freight Agent, in charge of the line between Cumberland, inclusive, and Moundsville, Parkersburg and Belington (not including Moundsville), with headquarters at Clarksburg, W. Va. Mr. Davis was Division Freight Agent in Tiffin, O. Andrew Stevenson, appointed Commercial Freight Agent, in charge of the Baltimore contracting agent's office, with headquarters at the Central Building, Baltimore.

*Boise, Nampa & Silver City.*—G. E. Howe has been appointed Chief Engineer of this proposed road in Idaho

*Columbus, Hocking Valley & Toledo.*—The following appointments are announced: C. F. Mayer appointed Assistant General Freight Agent, headquarters Columbus, O. H. O. Wassen appointed General Agent at Toledo, vice C. C. Gridley, deceased. H. E. Thatcher appointed Traveling Freight Agent, vice H. O. Wasson, transferred.

*Grand Trunk.*—Appointments and tranfers in the traffic department, announced last week, carry a step further the consolidation of the branch lines west of the St. Clair and Detroit rivers with the main line, and after April 1 the operation of the traffic department of all lines will be directed from Montreal. Circulars announcing the following appointments have been issued: The jurisdiction of General Traffic Manager Reeve is extended through to Chicago, Grand Haven, Muskegon and Saginaw. W. E. Davis, who has been General Passenger Agent of the Chicago & Grand Trunk for six years past, will be transferred as General Passenger and Ticket Agent of the entire Grand Trunk. Mr. George T. Bell, Assistant Passenger Agent at Montreal, has had his title changed to Assistant General Passenger and Ticket Agent. E. H. Hughes, for many years General Western Passenger Agent of the Grand Trunk and Chicago & Grand Trunk, becomes Assistant General Passenger and Ticket Agent, with headquarters at Chicago. He will have charge of passenger matters on the lines west of the Detroit and St. Clair rivers. In the Freight Department, the jurisdiction of Mr John W. Loud, recently appointed General Freight Agent, has been extended to the Western lines. Mr. David Brown will be First Assistant General Freight Agent, with headquarters in Chicago. Mr. John Earls, Division Freight Agent at Hamilton, Ont., has been superannuated, and Mr. Robert Quinn, who has been European Traffic Agent of the company at Liverpool, will return to Canada and take Mr. Earls' position as Division Freight Agent at Hamilton.

The newly appointed Freight Claims Agent, Mr. Charles J. Haigh, for many years at Detroit, assumed his new duties on April 1.

Mr. H. W. Walker has been appointed General Auditor, and will continue to perform the duties heretofore assigned the Chief Accountant.

*Gulf, Beaumont & Kansas City.*—The stockholders of the railroad held their annual meeting in Beaumont, Tex., March 18, and elected the following directors: E. E. Pratt, N. D. Silsbee, Boston; John H. Kirby, Houston; Wm. Wiess, W. A. Fletcher, John N. Gilbert and W. C. Averill, Beaumont. The directors elected: E. E. Pratt, President; John H. Kirby, Vice-President and General Manager; W. C. Averill, Secretary and Treasurer

*Maine Central.*—Owing to the death of Chief Engineer Allen the following changes in the engineering department have been announced by General Manager Tucker. Mr. Herbert C. Robinson, Assistant Engineer, will have charge of the civil engineering department of the company at Portland, Me. Mr. D. A. Booker will have charge of the maintenance of bridges, and the maintenance of buildings and other structures at Portland and on all lines of the company east of Portland. He will report directly to the vice-president. His title will be Bridge Inspector and his address at Brunswick, Me. The maintenance of roadway and track east of Portland, will be in charge of the roadmasters on the various divisions as at present designated. They will report directly to the Vice-President. Mr. George F. Black will have charge of the maintenance of roadway and track, and the maintenance of bridges, buildings and other structures on that part of the company's lines north of Portland. His title will be Assistant Engineer and his address Portland.

*Muscogee, Oklahoma & Western.*—P. J. Byrne, of Muscogee, Ind. Ter., has been elected President of this new company, in place of G. W. Sutton, resigned. W. H. Herbert is General Manager, with office at Cleveland, Oklahoma.

*New York, Ontario & Western.*—At a meeting of the directors of the company, held March 25, John G. Moore, of the firm of Moore & Schley, New York City, was elected a director to fill the vacancy in the Board caused by the death of Richard Irving.

*Norfolk & Ocean View.*—The office of General Manager of this road, extending from Norfolk to Ocean View, Va., has been abolished, and that of Superintendent created. By the change Mr. W. A. Barritt, late General Manager, retires, and Mr. Lee D. Mathes, of Memphis, Tenn., takes charge at the same salary paid the General Manager, $3,500.

*Pennsylvania.*—Charles Worthington, formerly with the Phœnix Bridge Co., is now Bridge Engineer in the Maintenance of Way Department of this company, with office in the Broad Street station, at Philadelphia.

*Pittsburgh & Northwest.*—The first directors of this new Pennsylvania company are: William Flinn, W. C. Lyme, James B. Kane, Davis M. Glass, Theo. W. Dierker and J. W. Patterson, all of Pittsburgh.

*Utah & California.*—The officers of this new company in Utah are George Q. Cannon, President; Theodore F. Meyer of St. Louis, and Allen G. Campbell, Vice Presidents; A. H. Cannon, Secretary. Treasurer and Manager. The officers of the Salt Lake & Pacific an allied corporation are George Q. Cannon, President; Joseph F. Smith and J. E. Dooly, Vice-Presidents; A. H. Cannon, Secretary and Treasurer, and N. W. Clayton, Manager.

## RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Baltimore, Chesapeake & Western.**—The Maryland Legislature has finally passed a bill incorporating this company and authorizing it to build a road from Hagerstown in the western part of the state to Point Lookout on Chesapeake Bay. There has been a long contest over this bill and by various amendments important clauses included in the original bill have been eliminated. The bill which has passed, however, authorizes the various counties through which the road is to be built to vote at the election in November on propositions to subscribe large amounts to the capital stock of the road and authorizes the Mayor and City Council of Baltimore and the Board of Public Works of the state to subscribe to the company's first mortgage six per cent bonds. The new company is to some extent a reorganization of the old Baltimore & Drum Point a project which has been talked of for many years under various names. The new company enlarges its plans to provide for an extension of the proposed line to Hagerstown as stated above. George E. Boynton, of Baltimore, is President and Frank C. Drane, also of Baltimore, is Vice-President and General Manager and the active promoter of the company. Other officers were given last week.

**Carolina, Tennessee & Ohio.**—Press dispatches announce that construction work was begun on this road near Wilmington, N. C., last week. The project is an old one, and familiar for some years as the Brunswick, Western & Southern. That company became defunct and has been succeeded by the one named above. The line proposed is about 30 miles long, from Wilmington to the Atlantic coast at Southport.

**Chesapeake & Western.**—The first section of this road between Bridgewater and Elkton, in Rockingham County, Va., was finally completed last week, the last rail connecting the two towns and the Norfolk & Western and the Valley Branch of the Baltimore & Ohio having been laid on March 27. The grading between these towns, a distance of about 27 miles, was practically completed at the first of the year, but the construction was first delayed by the building of a long trestle, and then by the necessity of rebuilding parts of the roadbed which were washed out by heavy rains, much of the grading having been done in the dry summer months. The equipment for the operation of this division has already arrived at Elkton, the eastern terminus, but the road is not likely to be ready for operation before the middle of April.

**Chicago, Burlington & Quincy.**—Congress has passed a bill authorizing this company, which leases the Atchison & Nebraska road, to purchase right of way through Indian reservations in Kansas and Nebraska on the west bank of the Missouri River. This will enable the company to relocate a section of the Atchison & Nebraska where the track has been frequently washed away by high water in the Missouri River.

**Chicago, Lake Shore & Eastern.**—This company has secured an ordinance from the city authorities of Hammond, Ind., to build an extension of its road through that town from the Illinois-Indiana state line at a point on the shore of Lake Michigan to the east line of the city, connecting with the Baltimore & Ohio, and from a point on the Chicago & Calumet Terminal Road, where it crosses the Pittsburgh, Fort Wayne & Chicago, south to the Corning steel plant, now operated by the Illinois Steel Co. This road is one of the half dozen lines controlled by the Calumet & Blue Island Railroad, and owned by the Illinois Steel Co.

**Denver, Cripple Creek & Southwestern.**—A survey for this road, which was incorporated in Colorado a few weeks ago to build from Denver to Cripple Creek mining district, is now being made under the direction of Chief Engineer Barlow. C. W. Fisher, President of the company, states that this preliminary survey will probably be completed by the middle of next month and that the report of Mr. Barlow will be immediately submitted to the directors of the Denver Chamber of Commerce, that body having promised to aid in the construction of the road.

**Florence & Cripple Creek.**—The contractors who are to rebuild the line of this road through Eight Mile Canon have the work now well under way. In addition to the contract for raising the roadbed a distance of 20 ft. for 9 miles, a further contract has been made with Orman & Crook, of Denver, for raising the grade between Russell and McCourt. The contract of Carlisle, Weitbrec & Ditmar is between McCourt and Adelaide, that station being about 10 miles from the initial point of the line at Florence, Col. This latter contract includes a tunnel 275 ft. in length. There will be some important steel bridges on the new line, but the aggregate amount of bridge work will be reduced nearly two-thirds by the construction of the new line.

**Gulf & Ship Island.**—Mr. C. A. Ralston, who is now Chief Engineer of this line, reports that construction work is now going on from both ends of the line, from Gulfport, its southern terminus on the Gulf of Mexico, and from Hattiesburg, Miss., on the New Orleans & Northeastern. The contract is let to S. S. Bullis, of Buffalo, N. Y., for rebuilding the line now built from Gulfport north 20 miles. Mr. Ralston states that the work is progressing very well and that the regrading of the section has been about completed and the new track laid for some miles north from Gulfport. The grading has also been completed for some miles out of Hattiesburg, and the tracklaying has just been started south from that town and already three or four miles completed. The distance between Hattiesburg and Gulfport is 70 miles, leaving about 50 miles of new road to be graded. An old grade built 10 years ago, when the construction of the road was first undertaken, can be utilized. The Bradford Construction Co., an eastern corporation, controls the railroad and is carrying on the work now being done. As well as rebuilding and extending the line that company expects to secure deep water at the southern terminus. It is proposed to extend the line some four or five miles out into Mississippi Sound toward Ship Island where it is expected to secure a depth of 25 ft. with little dredging.

**Kansas City, Pittsburgh & Gulf.**—Mr. F. S. Hammond, General Manager of the Texarkana & Fort Smith, one of the Southern lines of the company, makes the following statement as to the construction work now being done. The line is now completed to Shreveport from Texarkana, 72 miles, leaving but 70 miles between Texarkana and Fort Smith, Ark., upon which work is being rapidly pushed. Upon the completion of this last 70 miles the Kansas City, Pittsburgh & Gulf will be finished to Shreveport, and ready for operation of trains between Kansas City and Shreveport. Trains will be placed in operation between Texarkana and Shreveport in 30 days. On the Southern divisions of the line, extending from Shreveport to Sabine Pass, Tex., construction is to be pushed and three large gangs of men are in the field grading and tracklaying. On 75 miles of partly graded road extending from Shreveport south, there are 800 men engaged. Another force will work north from Beaumont. From Beaumont to Port Arthur, about 20 miles, grading has been completed and tracklaying will be commenced in a day or two. Nearly all the material needed for this work has arrived, and with fine weather this section will soon be ready for the trains. It is the intention to have the road in operation between Kansas City and Sabine Pass by the first of next year.

**Lake Superior & Ishpeming.**—About 800 men are working on this 20-mile road in Northern Michigan, and the grading is now about two-thirds completed. The road will run from Ishpeming to Marquette, passing through Neagunee, Eagle Mill, Bagdad and Presque Isle. Winston Bros., of Marquette, Mich., are the contractors for grading and tracklaying. The grading involves some heavy work, but the only important iron bridge is one over Dead River, 430 ft long. William S. Mather, of Cleveland, is President of the company, and S. S. Neff, of Marquette, is Chief Engineer.

**Lost Creek.**—This company was incorporated in Iowa recently to build a road from Lost Creek coal mines, near Oscaloosa, Ia., to connect with other roads. The incorporators are C. E. Lofland, F. E. Green and E. C. Smith, of Oscaloosa, Ia.

**Louisville & Nashville.**—It is reported that engineers of the company are making a preliminary survey for a branch road from a point on the main line, between Carter's Creek and Thompson Station, Tenn., to the Hickman County Phosphate lands. The proposed road will be about 25 miles long.

**New Roads.**—There are already more than half a dozen projects for building new railroad lines into the Cripple Creek region from Denver, Pueblo and other important cities in Colorado, and a new line which is now being discussed is for a road from Pueblo to Victor. The articles of incorporation will soon be filed at Denver. The line will be about 65 miles in length. At a recent meeting of citizens of Victor, Col., in the Cripple Creek mining district, which is named as the western terminus of the road, a committee consisting of J. B. Cunningham, F. Huff and others, were appointed to organize the company.

**Northern Central.**—It is reported that the company contemplates building a second track from Williamsport, Pa., toward Elmira, N. Y., during the summer. This is the Williamsport & Elmira road, and the total distance is about 75 miles. At present there is less than half a mile of double tracked road, but about 31 miles of sidings have been built on the division.

**Pittsburgh & Eastern.**—Tracklaying is now in progress on the 15 miles of graded line in Clearfield County, Pa. The officers state that construction work will be vigorously pushed the coming season. The maximum curvature is 8 deg. and the curvatures will not exceed 1 per cent. The bridges are iron and steel, with first-class masonry. The road is surveyed from Mahaffey, Clearfield Couty, to West Newton, Westmoreland County, a distance of 116 miles. In addition to the main line several coal branches are in contemplation. S. H. Hicks, Vice-President of the company, is in charge of the actual construction work.

**Pittsburgh & Lake Erie.**—Important maintenance improvements have just been begun on the line of this road. The first work to be done this summer will be the substitution of an 80-lb. rail section for the present section, and already the rails for about seven miles of track out of Pittsburgh have been distributed along the road. The curve at Esplen has been taken out and a new roadway built for a considerable distance at that point to secure a straight line.

**Pittsburgh & Northwest.**—This company was incorporated in Pennsylvania March 31, to build a road 50 miles long, from a point in the Thirty-sixth Ward of the city of Pittsburgh, Allegheny County, to a point in New Castle, Lawrence County. William Flinn, of Pittsburgh, is President.

**Portsmouth, Pig's Point & Newport News.**—This company has begun the location of a line from Portsmouth to Pig's Point, Va., and it is stated that the work of construction will begin this spring. The company has been formed by business men of Norfolk and Portsmouth, Va.

**Rio Grande Western.**—The grading on the extension of the Sevier road is now completed from its former terminus at Salina south to the mines at Richfield, Utah, and tracklaying will be commenced immediately. The extension is about 30 miles long. When the Sevier Valley road was organized in 1891 by the officers of the Rio Grande Western to extend that line south of Manti, 25 miles, a survey was made through to Marysville, 180 miles south of the former town. No construction work was done south of Salina, but it is stated that now that this work has been resumed it is very likely that a considerable portion of the line toward Marysville will be completed during the year. The survey to Marysville has been recently revised, and it is stated that contracts for work south of Richfield have been let to Jansen Brothers, of Elsinore, Utah, and Ross Brothers, these two contracts carrying the road to Joseph City, about 10 miles south of Richfield. Vice-President Dodge has stated that the extension of the line to Marysville depended largely upon the action of the people along the surveyed route in right of way matters.

**St. Louis, Avoyelles & Western.**—The tracklaying on this road reached a point about five miles south of Marksville last week and it was expected that the rails will be laid into that town by April 1. This will complete the entire line which has been under construction since last fall. The main line extends from Bunkie, a station on the Texas & Pacific south of Alexandria easterly to Simmesport on the Atchafalaya River. A county subscription of $150,000 depends upon the completion of the road this week.

**Salt Lake & Pacific.**—This company recently organized at Salt Lake City, with the Utah & California has been granted by the city some valuable land for its terminals, now used for park purposes. This grant was secured by promises to build a railroad west of Salt Lake City to connect with some line to Southern California. It is said that Mr. R. B. Stanton, a well-known civil engineer of Denver, has been engaged to make a survey of this proposed road. The incorporators include G. Q. Cannon, N. W. Clayton and other men well known in Salt Lake City. They now control the Salt Lake & Los Angeles, built from Salt Lake City to Saltair, Utah, about 15 miles. The charter of the Salt Lake & Pacific provides for a line directly west of Salt Lake City to the Nevada state line and that of the Utah & California for a line to the southern boundary of the state near St. George, in Washington County, a distance of over 300 miles. The Utah Improvement Co. has been formed by the directors to control the stock of both railroads. It is claimed that work will be begun within a few weeks on the westward extension beyond Saltair.

**Saluda & Southern.**—This company has been recently organized at Phœnix, Ariz., to build a system of roads through the property of the Rio Verde Canal Company in North Arizona, comprising about 200,000 acres of land in Salt River Valley. This company for some years past has been building important irrigating canals through this region and a great deal of the land is already under cultivation. The road will start from a new town being built by the Rio Verde Canal Co., about 18 miles north of Phœnix, and is to connect various towns in the region. The charter which has been filed at Arizona provides for the building of over 800 miles of road which, of course, is without meaning.

**Seaboard Air Line.**—It appears that this company has about decided to extend its line in North Carolina to Asheville, as recently explained in these columns. Last week the company made a formal offer to the French Broad Valley Railway Co., for its charter, to build from Rutherfordton, N. C., to Asheville, N. C., via Hickory Nut Gap, and a meeting of the French Broad Company has been called for April 4, to consider the proposition. The *Gazette*'s correspondent writes that there is hardly a doubt that the proposition will be accepted. The route by Hickory Nut Gap is 42 miles long. That route is the most available one, because much tunneling would be avoided. The country is rugged and mountainous almost the entire way, and the cost per mile of the road between the two points proposed will be considerable over any route that could be selected.

Mention was recently made in these columns that the company was also considering a proposition to extend its line from Charlotte to Concord, N. C., 22 miles. It now looks as though this extension will also be accomplished. At a meeting of business men of Concord a few days ago it was agreed to offer the company $100,000 in cash to aid in building the extension, $75,000 of the amount being subscribed.

**Sedalia, Warsaw & Southwestern.**—It is announced that this road, a narrow-gage line extending from Sedalia south to Warsaw, Mo.; a distance of 40 miles, is to be changed to standard gage at once. The road is leased by the Missouri Pacific, but is operated by Thomas F. Mitchum as Receiver.

**Tennessee Central.**—The contract for grading this road between Kingston and Knoxville, Tenn., a distance of about 42 miles, will be let shortly. The exact date has not yet been determined as it will depend upon the completion of the road between Rockwood and Kingston. Work has been recently resumed on this section on which about 13 miles had been graded before the appointment of the receiver. The grading has been entirely completed from Monterey east to Crossville, 21 miles. The new company, organized with the former receiver, Mr. C. O. Godfrey, of Fort Payne, Ala., as President, has undertaken to complete the work east of Crossville to Kingston and Knoxville. It is hoped to complete the tracklaying to Kingston during June. This will complete a line from Nashville to the Tennessee River, using the track of the Nashville, Chattanooga & St. Louis to Lebanon and the Nashville & Knoxville east of the latter town to Monterey. The new road when completed will be 100 miles long between Monterey, the terminus of the Nashville & Knoxville to Knoxville via the towns of Crossville, Rockwood, Harriman and Kingston. The work now going on is under contract to C. F. Newton & Co., A. Tubman and Thos. McFarland, whose present addresses are Rockwood, Tenn. The maximum grade is 2 per cent., and the maximum curves are 10 degrees. The work includes one tunnel 734 ft. long about one-half completed, and under contract to be completed June 15. The present officers are: C. O. Godfrey, President, Fort Payne, Ala.; W. E. Eastman, Secretary and Treasurer, Nashville, and R. L. Engle, Chief Engineer, Rockwood, Tenn.

**Thermal City & Panther Gap.**—A company has been organized under the above name, surveys have been completed and the work of grading commenced for a narrow-gage road from Panther Gap to Thermal City, N. C., a distance of six miles, with the intention of extending the line, as soon as it is put in operatton between those places, to Montford's Cove, about nine miles. One or two locomotives and accompanying rolling stock will be purchased and the line put in operation by fall.

**Tifton & Northeastern.**—The northern extension of this road has now been completed to the new town of Fitzgerald in Southern Georgia. This extension is about 12 miles long from Swan, the previous terminus of the road. The work on the extension was begun in January last.

**Washington & Potomac.**—The attorneys for this company have applied to the Maryland Legislature asking for an extension of the time named in the charter for building the road. This expires on May 1 of this year, but so far only about 20 miles of the road south of the city of Washington, D. C., have been built. The bill provides for an extension of the charter to May 1, 1900. It has already passed the Senate. The road is proposed to extend from Washington, D. C., to Point Lookout on Chesapeake Bay. The charter of the Baltimore, Chesapeake & Western just granted by the Maryland Legislature also provides for a line between these two points.

**Waycross Air Line.**—It is stated that this line is to be extended about six miles to the new town of Fitzgerald south of Abbeville, Ga., which already has connections with roads to the north and to the south, built this year. The new line will reach the town from the east from near Minnie in Irwin County. B. A. Denmark, of Savannah, is President of the railroad.

**West Virginia Roads.**—The grading was begun last week on a road which it is proposed to build from Clarksburg, W. Va., northwest to a point on the Ohio River at New Martinsville, W. Va., a town near the Pennsylvania state line. The new road will be about 70 miles long.

## Electric Railroad Construction.

**Alton, Ill.**—The contract for building the electric road on State street has been let to the White-Crosby Construction Co., of New York, and will be begun immediately.

**Bristol, Pa.**—The Borough Council has passed an ordinance finally granting a right of way through the town to the Langhorne & Newtown Railway Co.

**Brooklyn.**—The Nassau Electric Railroad has secured permits to build its extensions in Church Lane, Eighty-sixth street, Fifth avenue, Fourteenth avenue and Bath avenue.

The Brooklyn Heights Railroad Co. will run cars over a new route to Maspeth, Newtown and Corona about April 1. This will be part of the new road to Flushing, which will be in operation in the early summer.

**Chicago.**—Ordinances have been introduced giving permission to the West & Southtown Street Railway Co. and to the West Chicago Street Railroad Co. to lay tracks on several streets in Chicago. Also an ordinance giving permission to the North Chicago Street Railroad Co. and to the West Chicago Co. the right to use electricity on all their lines. The North Chicago Co. has two miles of track operated by horses, 17 miles by cable and 81 miles by electricity. The West Chicago Co. has 49 miles of track operated by horses, 30 miles by cable and 122 miles by electricity.

**Cincinnati, O.**—The directors of the Madisonville & Cincinnati Street Railway Co. have decided to apply to the County Commissioners for the right to build a double track street railroad from Madisonville over Columbian avenue to the city limits.

**Denver, Col.**—The Union Railroad Co. was incorporated last week by B. A. Jackson, William W. Field, Harlan P. Parmalee, Herman H. Dunham and Geo. C. Preston. Its purpose is to build or acquire street railroads in Denver and adjoining towns and to operate such lines in conjunction with the lines of the Denver City Railway Co. Many of the stockholders in the latter are also stockholders in the new company, but they will be operated separately, with only contracts for the use of lines and the interchange of accommodations. Only one new line is now contemplated, this being the Denver, Globeville & Golden, to connect the three localities named in a roundabout way with the lines of the City Cable Co. The capital stock is $1,000,000.

**Detroit, Mich.**—The directors of the Fort Wayne & Belle Isle Railway Co. have decided to relay the tracks on Monroe avenue, on Fort street, west of Clark avenue, and on River road, with 96-lb. rails. It has been decided to increase the capital stock from $300,000 to $400,000.

**Elyria, O.**—Incorporation papers have been applied for the new street railroad to connect Elyria, Oberlin, Amherst and Lorain. Among the incorporators are W. E. Miller, William G. Sharp, H. H. Clough and George Sharp. The capital stock will be $300,000, and there will be about 35 miles of track.

**Hagerstown, Md.**—Christian W. Lynch, William Jennings and John A. Herman, of Harrisburg, Pa., the principal stockholders of the Hagerstown Railway Co., have been awarded the contract by the company for building the electric railroad. Bond is given for the contractors by the Commonwealth Guarantee, Trust and Safe Deposit Co., of Harrisburg, in the sum of $350,000.

**Hull, Que.**—The Canadian Pacific Railway Co. has leased its Ottawa-Aylmer branch for 35 years to the Hull Electric Co. The road, which is nine miles long and connects Hull and Aylmer and the Pontiac & Pacific Junction Railroad, will be changed to an electric road. The company also lights Hull and Aylmer by electricity.

**Jamaica, L. I., N. Y.**—The Long Island Electric Railway Co. has filed a certificate of extension of route in the villages of Jamaica, Far Rockaway and Hempstead, L. I.

**Kalamazoo, Mich.**—It is said that the syndicate, which recently bought the Kalamazoo street railroad and which owns the plants at Battle Creek and Lansing, will build an electric road 75 miles long between the three towns.

**Lorain, O.**—A franchise has been granted to the Lorain & Cleveland Railway Co., for an electric road along the old Rocky River road. The company is to light, clean, and keep in repair, the bridge over Rocky River, and is to pave the approaches.

**Monroe, Mich.**—The Monroe, Dundee & Lake Erie Railway Co. was incorporated last week. The company will build an electric road between Monroe and Dundee, and expects to develep the summer resorts at Monroe. Work will be commenced when the weather permits and it is expected to have it finished by autumn. Among the directors are W. L. Johnson and Vincent Field of Detroit and A. B. Bragdon and F. G. Strong of Monroe.

**Montreal, Que.**—The Montreal Park & Island Railway Co. will this summer build seven miles of double track to Lachine, seven miles to St. Laurent and four miles to St. Vincent de Paul, including a bridge over the Beck River to cost $20,000.

**New Orleans, La.**—The Canal & Claibourne Railroad Co is making improvements and extensive extensions to its road. A year ago the company had only 13 miles of track and the cars were drawn by mules. Since that time, however, the company has been given a 67-year franchise for over 50 miles of track, which is now being built and will be equipped with electricity. Girder rails 60 ft. long and weighing 75 lbs. per yard will be used, and the ties will be of cypress laid in gravel. The contract for the rails has been let to the Johnson Co., of Lorain, O., and Johnstown, Pa. The cars have been ordered from the American Car Co., of St. Louis, and will be 28 ft. over all with General Electric motors, rated at 25 miles per hour, and will be mounted on Lord Baltimore trucks made by the Baltimore Car Wheel Co. The power house, which will be located near the river front, will contain two Allis engines of 450 H. P. each, the boilers for which will be furnished by the Edge Moor Iron Co.

**Rockville, Conn.**—The Selectmen of Vernon have granted the application of the Hartford, Manchester & Rockville Tramway Co. for the right to continue the electric road from Manchester to Talcottville, five miles from Rockville.

**Sioux City, Ia.**—A petition has been received by the Sioux City Traction Co., asking the company to extend its line from the end of West Seventh street north on Ross street to Sixteenth street.

**Wooster, O.**—The County Commissioners have granted a franchise to the Wooster, Medina & Cleveland Electric Railway Co. for a road over the Wooster pike, on the Brooklyn and Parma plank road, through the townships of Brooklyn, Parma, Middleburg and Strongsville. The company is to keep all crossings in order, construct new bridges and culverts where necessary, and to pay an annual rental of $50 per mile. It has the right to carry passengers boxed freight, mail and express, and to charge the same rates as steam roads. Work on the road, which is about eight miles long, must be begun within a year and finished within two.

## GENERAL RAILROAD NEWS.

**Atchison, Topeka & Santa Fe.**—Earnings for February are reported as follows:

| | 1896. | 1895. | Inc. or Dec. |
|---|---|---|---|
| Average oper. mileage... | $6,481 | 6,481 | ..... |
| Gross earn..... | 2,208.952 | 2,068,703 | I. 140,249 |
| Oper. exp..... | 1,592,270 | 1,690,456 | D. 98,186 |
| Net earn..... | $616,682 | $378,247 | I. $238,435 |

*Eight Months to Feb. 28.*

| | | | |
|---|---|---|---|
| Gross earn..... | $20,102,978 | $19,383,851 | I. $719,127 |
| Net earn..... | 4,925,834 | $4,774,110 | I. $151,814 |

**Central of New Jersey.**—Earnings for February compare as below, for three years:

| | 1896. | 1895. | 1894. |
|---|---|---|---|
| Gross earn..... | $821,549 | $793,735 | $761,661 |
| Oper. exp. & taxes..... | 602,869 | 572,031 | 581,080 |
| Net earn..... | $218,680 | $221,704 | $183,581 |
| P. c. exp. to gross..... | 73½ | 72½ | 76 |
| Net 2 months... ..... | 569,249 | 468,539 | 445,567 |

The company's net earnings in February, 1893, were $414,331; in 1892, $505,715.

**Chesapeake, Ohio & Southwestern.**—The United States Supreme Court, in a decision announced this week, confirms the opinion of the Kentucky Court of Appeals prohibiting the lease of this road by the Louisville & Nashville, which was agreed to in 1893. The opinion of the Kentucky court was based upon the provision of the constitution of the state of Kentucky forbidding the consolidation or leasing of parallel railroads. The agreement which is thus prevented from being carried out by decisions of the highest courts provided for the purchase of the stock and a guarantee of the bonds of the Chesapeake, Ohio & Southwestern by the Louisville & Nashville, which issued notes for the purchase, with these securities as collateral. These notes were guaranteed by the Illinois Central, and on the failure of the Louisville & Nashville to meet its interest payments the Illinois Central assumed the operation of the road and is now operating it.

**Chicago, Milwaukee & St. Paul.**—Earnings for February were:

| | 1896. | 1895. | 1894. |
|---|---|---|---|
| Gross earn ..... | $2,305,679 | $1,927,522 | $2,106,786 |
| Oper exp..... | 1,565,978 | 1,331,929 | 1,531,979 |
| Net earn..... | $739,701 | $595,593 | $574,807 |
| P. C. exp. to gross..... | 67½ | 69¼ | 72¾ |
| Net, 8 mos..... ..... | 9,430,009 | 6,569,115 | 7,753,917 |

The company earned net in February, 1893, $443,617; in 1892, $583,923; in 1891, $412,596; in 1890, $442,551.

**Cleveland & Pittsburgh.**—The annual report of this company—which is operated by the Pennsylvania—for the year to Nov. 30, shows the following results of operation:

| | 1895. | 1894. | Inc. or Dec. |
|---|---|---|---|
| Passenger..... | $615,658 | $584,186 | I. $31,472 |
| Freight ..... | 2,784,145 | 2,186,019 | I. 598,126 |
| Mail, express, etc..... | 155,694 | 127,514 | I. 28,180 |
| Totals... ..... | $3,555,497 | $2,897,719 | I. $657,778 |
| Oper. exp. and taxes..... | 2,076,426 | 1,802,338 | I. 274,088 |
| Net earn..... | $1,479,071 | $1,095,381 | I. $383,690 |
| Div. rentals and int..... | $1,136,170 | $1,150,833 | D. $14,663 |
| Balance to lessee.....sur. | 342,901 | (def.) 55,452 | ..... |

The volume of business for the calendar year 1895 is without precedent in the history of the property. The tonnage carried reached an aggregate of 5,189,510 tons, against 3,923,613 tons in 1894, an increase of 1,265,897 tons, or 32.26 per cent. The increase in tons carried one mile is still larger, being 35.56 per cent. The passenger business, although very fair, compares less favorably, the increase in revenue over that for 1894 being 5.39 per cent. The lessee reports expenditures during the year for account of betterments in the sum of $298,741.

**Detroit, Lansing & Northern.**—Foreclosure suits were begun in the United States Court at Grand Rapids, Mich., on March 25, against the Detroit, Lansing & Northern; Detroit, Lansing & Grand Rapids, and Saginaw & Western roads. The suit is begun by Boston holders of the bonds, and is the first step in the reorganization of the system, which has been contemplated for the last three years. The mortgage bonds against the Detroit, Lansing & Northern, on which the suits are based, aggregate $1,150,000, and those on branch roads bring the total up to about $2,225,000. The bill asks for the appointment of a receiver.

**Duluth & Winnipeg.**—Judge Sanborn, of the United States Court at Duluth, has made an order postponing the sale of the road to April 22 and also allowing Foley Bros. & Guthrie, railroad contractors, to file affidavits showing why they should be allowed to be made parties in the suit.

**Great Northern.**—The United States Supreme Court has decided adversely to the company the suit brought by a stockholder last fall to enjoin its officers from carrying out the proposed agreement for the guarantee of the Northern Pacific securities.

**Humeston & Shenandoah.**—This road was sold at Clarinda, Ia., on March 31, under a decree of the United States Circuit Court for $2,900,000, being bid in by Receiver E. C. Murphy for C. E. Perkins, President of the Chicago, Burlington & Quincy.

**Louisville, Evansville & St. Louis Consolidated.**—Judge Woods, of the United States Circuit Court in Louisville, has removed E. O. Hopkins and J. H. Wilson, Receivers of the Eastern Division, and has appointed George T. Jarvis sole receiver. The order, which is to take effect on May 1, was entered in the suit brought by the Amercan Loan and Trust Company. It applies only to that part of the main line between New Albany and Mount Vernon, Ill., 187 miles.

**Maricopa, Phœnix & Salt River.**—A mortgage in favor of the Farmers' Loan & Trust Company, of New York, covering the franchises of the company and the rolling stock of the road from Maricopa to Phoenix and from Tempe to Mesa, has been filed at Phoenix, Ariz., to secure the payment of bonds to the amount of $860,000. Of the bonds covered by this mortgage $540,000 were issued in 1886 to build the road from Maricopa to Phœnix, 34 miles. The line from Phœnix to Mesa is 18 miles long and has been built recently.

**Memphis & Charleston.**—Adrian Iselin, Jr., Chairman of the Reorganization Committee, gives notice that more than a majority of the seven per cent. bonds have assented to the reorganization plan. The details of the plan were given in this column three weeks ago.

**New Orleans & Southern.**—Important improvements to the roadbed have been made since the operation of this road was assumed by the New Orleans & Western, which is the company engaged in building the important terminal system at New Orleans. The New Orleans & Southern is controlled in England, and the directors some weeks ago decided to suspend the operation of the road. It owns about 50 miles of road running along south of New Orleans along the east side of the Mississippi River to the town of Bohemia. A few years ago the New Orleans, Fort Jackson & Grand Isle road built a line south of New Orleans along the west side of the Mississippi River to a point some miles south of the terminus of the New Orleans & Southern. The chief business of the road has been the passenger traffic over the Shell Beach Branch which reaches a popular excursion resort near New Orleans.

**Pennsylvania.**—The earnings for the Eastern lines for February are reported as follows :

| | 1896. | 1895. | 1894 |
|---|---|---|---|
| Gross earn | $4,656.036 | $4.419,631 | $4,002,320 |
| Oper. exp | 3,532,933 | 3,270,733 | 2,876,600 |
| Net earn | $1,123.103 | $1,148,901 | $1,125.720 |
| P. c. exp. to gross | 75¾ | 74 | 71⅞ |

The lines east of Pittsburgh and Erie earned net in 1893 $1,236,361, in 1892 $1,571,931 in 1891 $1,308,969, in 1890 $1,395,131, and in 1889 $1,391,442. All lines west of Pittsburgh and Erie report February gross earnings increased $145,400, operating expenses increased $174,900, and net earnings decreased $29,400. In February, 1895, the increase in gross earnings over February, 1894, was $305,877, and in net earnings, $253,519.

**Philadelphia & Reading.**—The February earnings of the railroad are given below:

| | 1896. | 1895. | Inc. or Dec. |
|---|---|---|---|
| Gross receipts | $1,350,306 | $1,444 842 | D. $94,536 |
| Gross exp | 843,346 | 89,109 | D. 54,762 |
| Profit in operating | $506,959 | $546,733 | D. $39.773 |
| Other receipts | 19,404 | 21,814 | D. 2,410 |
| Profit for month | $526,363 | $568,547 | D $42,184 |
| Equip. & other payments. | 185,636 | 109,945 | I. 75,691 |
| Fixed charges | 880,636 | 804,219 | I. 76,417 |

For the fiscal year to date the comparison with 1895 is as follows:

| | | | |
|---|---|---|---|
| Gross receipts | $4,969,015 | $4,565,077 | I. $343,937 |
| Profit in operating | 2,069,957 | $1,777,881 | I. 292 075 |
| Total profit for month | 2,243,889 | 1,961,652 | D. 272,236 |
| Total charges | 3,042,731 | 2,529,890 | I. 512,741 |
| Deficit | 798 843 | 568,238 | I. 230,604 |

The equipment payments in 1896 were $787,395, and included $520,000 Car Trust Certificates matured during the years 1894 and 1895, not properly chargeable to the business of 1896.

The Coal & Iron Co. earned $1,504,340 gross in 1896, a decrease of $470,885. The deficit was $296,049, an increase of $126,872. For the year the deficit was $546,128, a decrease of $109,848.

**Pittsburgh & Castle Shannon.**—The directors have decided to issue bonds of the company to the amount of $50,000 which were authorized at a recent meeting of the stockholders to provide funds for changing the motive power to electricity. The road is a narrow gage line about six miles long owning very little passenger equipment and less than 400 freight cars.

**Pittsburgh, Marion & Chicago.**—A New York syndicate has been formed to purchase the road, which extends from New Galilee to Lisbon, O., and is to be sold shortly. It is proposed to extend the road to Wampum, Pa., where it will connect with the Pennsylvania lines, Pittsburgh & Lake Erie and Pittsburgh & Western. It is also proposed to build another link from Lisbon to Alliance and Congress Lake, where it would connect with the Cleveland, Canton & Southern and obtain an entrance to Cleveland.

**Rockville.**—The New England directors some time ago voted to discontinue operating this road on March 31, but have consented to continue operating the road from day to day, without a lease. The New England will probably purchase the stock, as it has in the case of the Woonsocket & Pascoag road. The road is only 4.43 miles in length, from Vernon to Rockville, Conn., and has $108,750 stock outstanding.

**Southern.**—February earnings are reported as follows:

| | 1896. | 1895. | 1894. |
|---|---|---|---|
| Gross earn | $1,494,918 | $1,261,908 | $1,448,292 |
| Oper. exp. & taxes | 1,064,454 | 878,562 | 1,009,972 |
| Net earn | $430,464 | $383.346 | $438,320 |
| P. c. exp. to gross | 71¼ | 69⅝ | 69¾ |
| *For eight months :* | | | |
| Gross earn | $13,451,370 | $12,404,590 | $11,175,662 |
| Oper. exp. & taxes | 9,067,021 | 8,372,282 | 9,727,387 |
| Net earn | $4,384,349 | $4,032,308 | $3,448,275 |

The Alabama Great Southern, operated by the Southern, reports $20,076 net earnings in February, 1896, a decrease of $6,203.

**Seattle, Lake Shore & Eastern.**—At a meeting of holders of first mortgage bonds of the company in New York City last week the Reorganization Committee was empowered, by a practically unanimous vote, to carry out the reorganization agreement, which provides for foreclosing the road and for the issue of new bonds and stock. There was represented at the meeting $4,045,000 out of a total amount of bonds outstanding of $5,558,000.

**Wabash.**—For February the company's earnings were as below:

| | 1896. | 1895. | 1894. |
|---|---|---|---|
| Gross earn | $926.271 | $844,529 | $862.485 |
| Oper. exp. | 668,533 | 669,500 | 697,445 |
| Net earn | $257,738 | $175,029 | $165.040 |
| P. c. exp. to earn | 72¼ | 79¼ | 80⅞ |
| Net 2 months | 500,393 | 371,528 | 320,513 |

The Wabash net earnings in February, 1893, were $226,-404; in 1892, $222,152.

**Washington County.**—The Maine Railroad Commissioners have approved the location of the road through Washington County. Commencing at Calais, the line goes through the towns of Robbinston, Perry, Eastport, Marion, Machias, Whitneyville, Jonesboro, Columbia Falls, Columbia, Harrington, Cherryfield, Milbridge and Steuben, to the east bank of Sullivan River in Hancock County. The proposed road is 110 miles long along the Maine Shore Line. Mitchell & Westcott, of Portland, Me., are the contractors.

**Wellston & Jackson.**—The directors of this road, operated by electricity and steam, from McArthur Junction to Jackson, O., have formally transferred the line to the Columbus, Hocking Valley & Toledo. The road is about 17 miles in length.

## Electric Railroad News.

**Carbondale, Pa.**—At a special meeting of the stockholders of the Carbondale & Forest City Passenger Railway Co., and the Carbondale Traction Co., the two companies were consolidated.

**Cleveland, O.**—Preliminary plans have been made for a large car house for the Cleveland Electric Railway Co. The building is to be 520 ft. × 120 ft. fronting on Euclid avenue. It will be two stories high with a tower and will be built of steel, brick and slate, making it fireproof. The company will have its offices on the second floor, and there will be a waiting room for passengers on the east side of the building. J. N. Richardson is the architect.

**Fairhaven, Wash.**—The Fairhaven & New Whatcom Railway Co. is in the hands of receivers, E. J. Hill, of New Whatcom, representing the local creditors and Norman Tucker, the interest of the Atlantic Trust Co. The road has been in operation since 1892.

**Montreal, Canada.**—The large office building of the Montreal Street Railway Co., on the corner of Craig street and Place d'Armes has been finished. The halls throughout the building are wainscotted with marble, and the floors laid with marble slabs. Plant & Bubuc were the contractors for the stone work, the Dominion Bridge Co., for the iron work, Joseph Robert & Sons, for the wood work, Castle & Sons, for painting and decorating, and Robt. Reid for marble.

**Trenton, N. J.**—Governor Griggs has approved the bill restricting electric railroad companies by compelling them to deposit $25,000 with the State Treasurer.

## TRAFFIC.

### Traffic Notes.

A new stockyards company has been incorporated at Buffalo, N. Y.

The Mexican National has put on six new Pullman buffet cars to run between Laredo and the City of Mexico.

The office of the Southwestern & Mississippi Valley Freight Committee has been opened in the Columbia Building, Louisville, Ky. The Commissioner is Mr. M. P. Washburn.

The Texas Car Service Association has voted to collect storage on goods in freight houses; and from the tenor of the reports it would seem that the intention is to establish regulations at all important places.

The Illinois lines carrying coal to St. Louis have had a conference and reached an agreement as to freight rates from the mines within a radius of 67 miles, but, according to the *Republic*, the agreement does not amount to much. Not much coal will move in the immediate future and one railroad gave only conditional approval.

Owners of canal boats running between Buffalo and New York City met in New York last week and formed an association to maintain transportation rates during the coming season. The attendance was large, and it is said that the owners of over 80 per cent. of the boats on the Erie Canal signed the agreement to maintain rates.

The Railroad Commissioners of Kansas, on complaint of a retail lumber dealer at Olathe, have rendered a decision, similar to that recently announced by the Georgia Commissioners, that demurrage charges on freight cars must be uniform at all stations. The Commissioners find that demurrage rules are reasonable, that 48 hours is a reasonable free time, that $1 a day is a reasonable charge; and they order that the demurrage rules of the Missouri & Kansas Car Service Association be put in force throughout their jurisdiction, which means the whole State of Kansas.

The hearing on the injunction suit of the United States against the Joint Traffic Association has been postponed until April 21. The complaints of New York grain merchants concerning the rates on corn from the West to the Atlantic seaboard, which rates they say have greatly injured their business, have been the subject of several conferences between a committee of the merchants and the Board of Managers of the Joint Traffic Association, and it is announced that the Association has promised that the roads leading to ports south of New York shall hereafter refrain from absorbing elevator charges. The payment of this charge, 1¼ cents a bushel, by the railroad companies, is said to have been the most important factor in turning a large percentage of the corn sent to Europe this year over the Chesapeake & Ohio and roads leading to Norfolk and Baltimore.

### Grain Rates to Galveston and New Orleans.

The general freight agents have finished checking the grain rates made to Galveston and New Orleans by Arbitrators Faithorn and How, and tariffs will be published at once. A good part of the time of the meeting was given up to a dispute as to what was intended regarding the rates from Wichita, Kan., and the controversy had to be referred back to the arbitrators. The Missouri Pacific contended for the same rates from that point to New Orleans as were given the Santa Fe to Galveston, but the arbitrators disallowed the Missouri Pacific's claim. The rate on export corn from Wichita to Galveston will be 27 cents, and on wheat 4 cents higher, or 31 cents. This is a reduction of 5 cents on corn and 4 cents on wheat; the rate from Wichita to New Orleans, via the Atchison, is 28 cents, or a cent higher than to Galveston, and wheat 32 cents, also a 1 cent advance. Rates from that point to New Orleans, by the Missouri Pacific and 'Frisco roads, are 35 cents on wheat and 32 cents on corn, an increase over Galveston rates of 4 cents and 5 cents respectively.

### Chicago Traffic Matters.

CHICAGO, April 1, 1896.

Chicago railroad officers do not feel alarmed over the Supreme Court decison in the Brown case. Those who have always desired to maintain tariff rates to all shippers, approve it, while those who think their lines can not exist unless half the shippers are given some concessions are mildly strong in their denunciation of the decision. Every one is anxious, however, to have the Interstate law amended so as to make the corporation instead of the individual liable for violations. One officer said: "If the corporation instead of the individual were liable I would at once proceed against three of my competitors for rate cutting."

The trouble over the diversion of Iowa corn has at last been settled. The trouble was originally started by the St. Louis, Keokuk & Northwestern reducing rates from Keokuk to St. Louis to meet alleged Mississippi River competition. The Rock Island then reduced from Des Moines, and rates on both roads were several cents below those to Chicago. The Iowa lines leading to Chicago protested vigorously and the question was referred to the executive officers. The Rock Island has now agreed to cancel its low tariff to St. Louis.

At the joint meeting of the Trunk Line and Central Passenger Committees, in this city, an entire set of new rules and regulations to govern interchange passenger traffic between the two territories was adopted and referred to the Board of Managers of the Joint Traffic Association. Among the recommendations was the adoption of a uniform certificate for selling excursion tickets.

The Great Northern has shortened the passenger train time between St. Paul and Seattle about six and a half hours and buffet library cars will be put on.

Chicago merchants and shippers are very anxious to have all lake and rail differential rates from Milwaukee East and South abolished. The Chicago and Ohio River lines have withdrawn these rates from Milwaukee to Ohio River points, and have asked the roads of the Central Freight Committee to abolish them to all points west of the Indiana and Ohio State line. If this action is taken it would still leave the rates in effect to all points east of the above line.

Chicago brokers are attempting to secure the redemption of unused mileage books, on which the time is about to expire, by writing requests on letterheads of prominent business houses to which the books were originally sold.

Western roads have refused to grant half-fare rates to army and navy officers except when they are traveling on business strictly connected with their duties.

All second class tickets reading from St. Louis to St. Paul and points beyond, via Chicago, are to be withdrawn, on account of the wholesale scalp to which the tickets are subjected in this city. These tickets have been off sale for some time between St. Louis and St. Paul, but were still being sold via Chicago to points beyond St. Paul.

The Burlington has opened its new line via Alton. Hereafter all trains on its St. Louis Division will be run via this route.

Eastbound rates from Chicago continue to be firmly maintained at tariff, though the elevator allowances continue to cause trouble with little prospect of an immediate settlement. It seems that the contracted allowances of no two roads are the same, and the shippers, of course, refuse to make any concession from their legal rights for the sake of the Joint Traffic agreement.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending March 28, amounted to 88,032 tons, against 81,827 tons for the preceding week, a decrease of 6,205 tons, and against 60,533 tons for the corresponding week last year. The proportions carried by each road were:

| Roads. | WEEK TO MARCH 28. | | WEEK TO MARCH 21. | |
|---|---|---|---|---|
| | Tons. | p. c. | Tons. | p. c. |
| Michigan Central | 8.742 | 9.9 | 7,256 | 8.8 |
| Wabash | 7,025 | 8.0 | 4.992 | 6.1 |
| Lake Shore & Mich. South. | 11,216 | 12.7 | 11,550 | 14.1 |
| Pitts., Ft. Wayne & Chicago | 7,053 | 8.0 | 7,989 | 9.8 |
| Pitts., Cin., Chi. & St. Louis. | 8,057 | 9.1 | 7,993 | 9.8 |
| Baltimore & Ohio | 7,296 | 8.3 | 6,221 | 7.7 |
| Chicago & Grand Trunk | 12,907 | 14.7 | 11,384 | 13.9 |
| New York, Chic. & St. Louis | 6,752 | 7.7 | 7,422 | 9.0 |
| Erie | 15,329 | 17.4 | 13,677 | 16.7 |
| C., C., C. & St. Louis | 3 655 | 4.2 | 3,343 | 4.1 |
| Totals | 88,032 | 100.0 | 81,827 | 100.0 |

Of the above shipments 2,003 tons were flour, 56,479 tons grain and mill stuff, 9,108 tons provisions, 8,684 tons dressed beef, 2,314 tons flaxseed, 1,684 tons butter, 1,392 tons hides and 4,684 tons lumber.